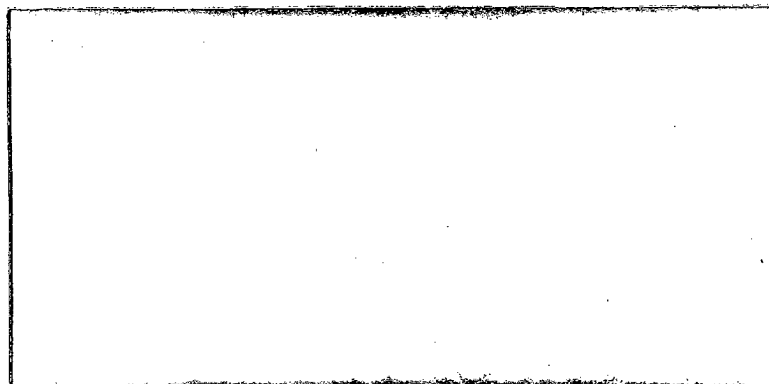


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**OPERATING INSTRUCTIONS
AND MAINTENANCE GUIDE**

TC-2 PHASE III 1962
TRANSMITTER

Doc. No. 100-1.5-22R

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WIRING LIST

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SECTION I GENERAL DESCRIPTION

1.1 Introduction

1.2 This manual provides operating instructions for the Message Recording and Transmitting Equipment 100-1. The equipment consists of a modified IBM electric typewriter, a five-channel closed-loop tape recording and playback system, a transmitter, a control unit, a power supply, and a modified standard telephone instrument. The purpose of the equipment is to provide a communication system utilizing existing telephone circuits with a low probability of detection.

1.3 This section of the manual describes the general theory of system operation and lists the general system characteristics. Detailed operating instructions are given in Section II.

1.4 General Description of System Operation

1.5 Operation of the system is controlled from the keyboard of the modified IBM electric typewriter. In the RECORD mode, the operator types the desired message on the keyboard. During this mode, the typewriter operates in the normal manner to provide a hard copy of the message to be transmitted, an important feature of the system. At the same time, the typewriter keyboard supplies output signals in the form of electrical pulses in standard 5-bit teletype code. These signals are applied to the recording channel and recorded in binary form on a closed loop of magnetic tape. Up to 3600 message characters may be recorded on the 18-foot tape loop.

1.6 In the TRANSMIT mode, the operator establishes telephone contact with the receiving station, using the modified telephone

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instrument. Whenever the operator's voice exceeds a predetermined threshold level, the playback channel of the tape recorder supplies coded message pulses to the transmitter. These pulses are used to control a set of five tone generators. The tone generator outputs then represent the 5-bit teletype code for each character in the message. The tone generator outputs are combined with the audio signal from the telephone in such a way that they can be detected only by the special Receiving Equipment. The Receiving Equipment is used to punch a paper tape which in turn may be used to operate a standard teletype printer.

1.7 When the modified IBM typewriter and telephone instrument are disconnected from the system they can be operated in the normal manner.

1.8 Functional Description

1.9 Figure 1-1 is a simplified block diagram of the record, playback and tape control circuits, and Figure 1-2 is a simplified block diagram of the transmitting circuits. General system characteristics are listed in Table 1-1.

1.10 Referring to Figure 1-1, binary output signals from the typewriter keyboard code matrix are supplied to a five-channel record amplifier circuit. As described previously, the output code for each keyboard character is in the form of the standard 5-bit teletype code. In the RECORD mode, the amplified outputs from the five record amplifiers are fed in parallel to the 5-track closed-loop tape recording circuit. Thus, the five binary bits for each message character are recorded simultaneously on the tape, one bit on each track.

1.11 An 18-foot closed loop of tape is used in the system for recording up to 3600 message characters. The tape is stored in a random fashion

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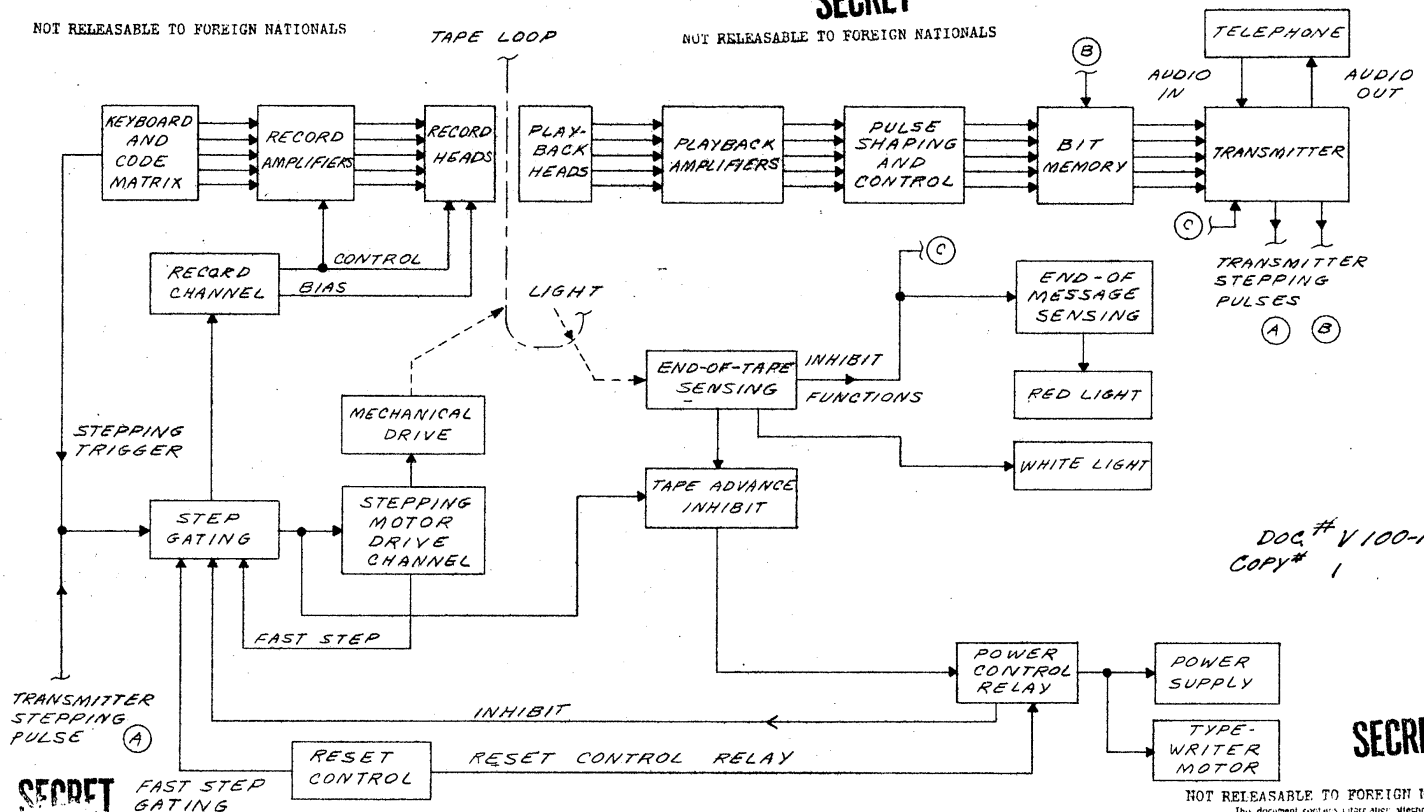
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FIGURE 1-1, RECORD, PLAYBACK AND TAPE CONTROL CIRCUITS, SIMPLIFIED BLOCK DIAGRAM

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within an enclosed bin. A sprocket drive mechanism advances the tape in .06-inch steps, one step per character. In the RECORD mode, the keyboard code matrix supplies a stepping trigger pulse to the tape control mechanism each time a keyboard character is pressed by the operator. Logic circuits control the recording circuits so that no signals are applied to the record heads except when the tape is in motion. Maximum recording speed is 10 steps per second.

1.12 After the desired message has been recorded, the reset function is activated by pressing a special key on the typewriter. This initiates the fast-stepping action of the tape control mechanism (50 steps per second), and returns the tape loop to the starting position. The system is now ready for message transmission, and the operator switches from RECORD to STANDBY mode, using a special control switch on the typewriter. When the party to whom the message is to be sent has been contacted by telephone, the operator switches from STANDBY to TRANSMIT mode. In this mode, the stepping action of the tape unit is controlled by the transmitter, which supplies a stepping pulse each time the audio energy level in the operator's voice signal exceeds a preset threshold level.

1.13 Each time a transmitter stepping pulse occurs, the tape steps in the same manner as in the RECORD mode, except that the playback function is now activated and the record function is inhibited. The stepping pulse also resets the bit memory in preparation for storage of a new character code. During the stepping pulse, which lasts for 20 milliseconds, the code pulses associated with a recorded character are read from the five tape tracks and applied to a pulse-shaping and control circuit. This circuit supplies a pulse to the bit memory whenever a binary 1 is read from the tape in a given channel. Thus,

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the 5-bit binary code for the character recorded at that position on the tape is transferred to the bit memory. During the next subsequent transmitter keying interval, the code stored in the bit memory is transferred to the tone keying circuits in the transmitter and the appropriate tones, representing the 5-bit binary code, are transmitted over the telephone circuit.

1.14 At the end of the transmitter keying interval, a new trigger pulse is generated, resetting the bit memory and initiating readout of a new character code into the bit memory. This action is repeated until the entire message has been transmitted. At that time, the end-of-message sensing channel causes a red light to be turned on under the typewriter keyboard, signalling the operator that the entire message has now been transmitted. If the operator leaves the system in the TRANSMIT mode, the tape will continue to step each time the threshold is exceeded, even though message transmission has ceased. When the tape has cycled through the entire 3600-step loop, the end-of-tape sensing channel supplies inhibit signals which disable the stepping function, gate off the tone generators in the transmitter, turn off the red light, remove power from the typewriter motor, and turn on a white light (also located under the typewriter keyboard). This action prevents accidental re-transmission of the recorded message. Alternatively, the operator can initiate the reset function when the red light signals the end of message transmission. This action causes the tape to step rapidly through the remainder of the loop, after which the end-of-tape sensing channel supplies inhibit signals in the manner described above, except that the tape stepping function is not inhibited and power is not removed from the keyboard. The operator then has the option of continuing the telephone conversation, thus initiating automatic re-transmission of the message, or terminating the contact. In the latter case, the system is ready for the recording of

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a new message.

1.15 The end-of-tape sensing channel, in addition to the functions described above, also provides protection against accidentally erasing a recorded message. This could occur if the operator attempts to record a message in excess of 3600 characters. After 3600 characters have been recorded, the tape will have stepped through the entire 18-foot tape loop and the first character will again be under the record head. If recording were allowed to continue, the first part of the message would be automatically erased as the new characters were recorded. To prevent this, the end-of-tape sensing channel inhibits the tape stepping action and disconnects power from the typewriter motor in the manner described previously. To restore power, the operator must initiate the reset function.

1.16 The functional circuits of the transmitter are shown in the simplified block diagram of Figure 1-2.

1.17 Figure 1-2 is a simplified block diagram of the transmitter circuits. When the system is operating in the TRANSMIT mode and telephone contact has been established with the receiving station, the operator's voice signals from the telephone are used to key the transmitter and to mask the tone bursts which represent the message character code groups. The audio input signal from the telephone is applied to a series of amplifiers and filters in the transmitter. The first amplifier circuit is controlled by an AGC loop which maintains a nearly constant average signal level over a wide dynamic range of input signals. The filter circuits limit the signal bandwidth to the normal speech frequency range used in telephone communication. The signal output from the second amplifier and filter channel is applied to a notch filter which removes all signal energy in the 1250 to 1900 cps frequency range. The five tone frequencies which carry the message

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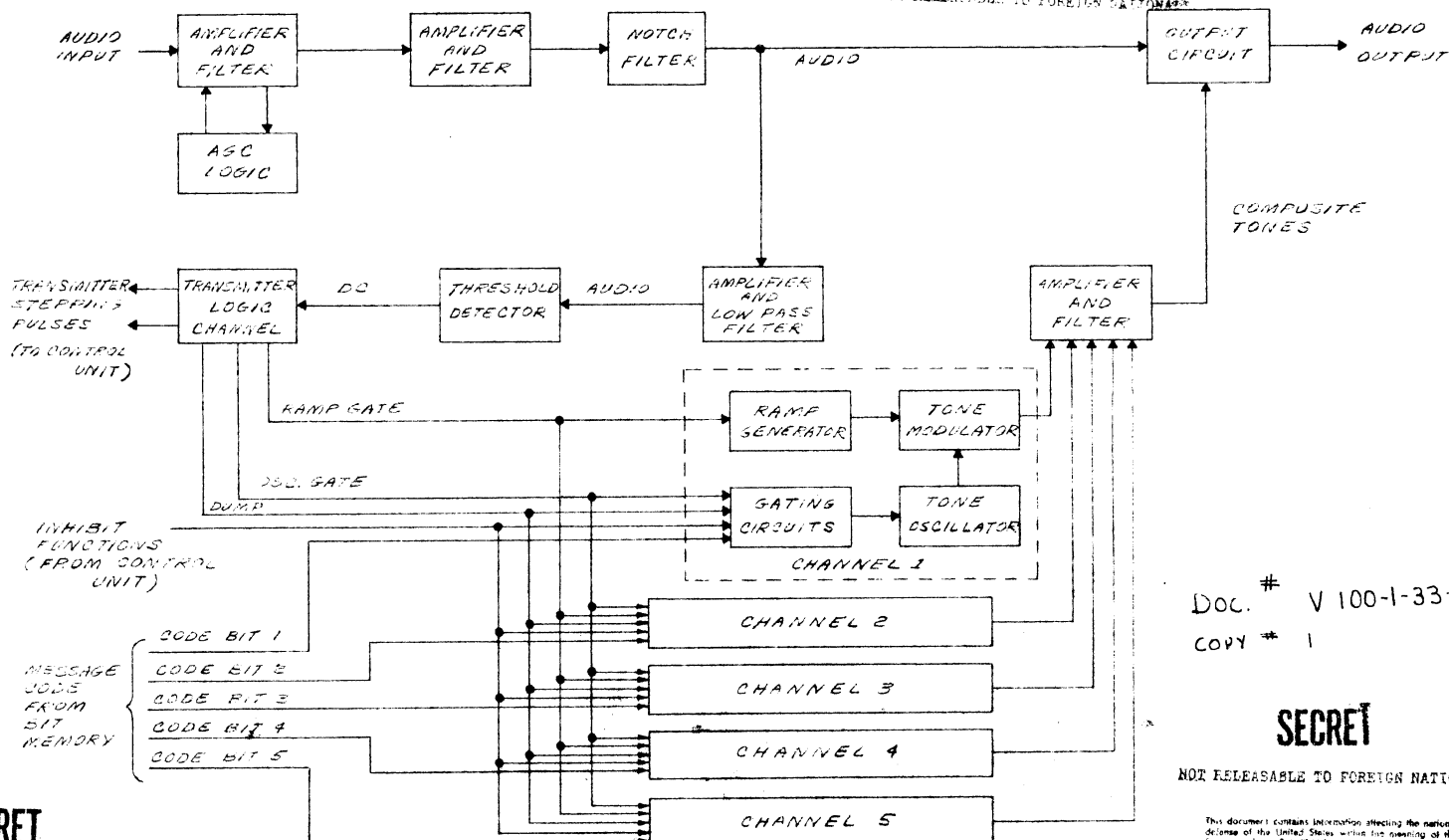
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FIGURE 1-2, TRANSMITTER CIRCUITS, SIMPLIFIED BLOCK DIAGRAM

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information are subsequently inserted within this narrow band-width, and therefore are effectively "masked" by the voice signal.

1.18 The output signal from the notch filter is applied in parallel to the transmitter output circuit where the composite tone signals are mixed with the speech signal, and through an amplifier and low-pass filter circuit to a threshold detector. The low-pass filter is used to ensure that only low-frequency audio energy will operate the threshold circuit; this improves the probability that the tone bursts will be effectively masked. When the audio signal level is above the preset threshold level, a DC output is supplied to the transmitter logic channel which initiates the 40-millisecond transmitter keying interval. During this interval, the appropriate tone oscillators are gated on and modulated by a symmetrical ramp generator voltage to provide a triangular modulation envelope. The tone modulator outputs are mixed in an amplifier and filter circuit which eliminates harmonics of the tone signals, then mixed with the speech signal in the output circuit and fed back into the telephone line.

1.19 As shown in Figure 1-2, the transmitter logic channel provides three output signals to each tone oscillator channel: a ramp gate, an oscillator gate and a "dump" signal. The ramp gate and oscillator gates are present for the first 20 milliseconds of the 40-millisecond keying interval, during which time the ramp generator output is increasing. During the second 20 milliseconds of the keying interval, the ramp generator output decreases linearly back to zero and the oscillator gating circuits are held open by a time constant circuit. The gating circuits are then deactivated by the dump pulse which occurs at the end of the 40-millisecond interval.

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1.20 During the second 20 milliseconds of the keying interval, the transmitter logic channel provides two identical output signals to the control unit. These are the transmitter stepping pulses used to advance the tape and reset the bit memory, as described previously. Thus, the first half of each keying interval is used to gate on the appropriate tone oscillators in accordance with the data stored in the bit memory, and the second half is used to read the next character code from the tape and enter this new data in the memory.

1.21 At the end of the 40-millisecond transmitter keying interval, if the audio signal is still above threshold level, or has again reached threshold level, the entire process will be repeated. If the signal has fallen below threshold level, the tone generator circuits will remain quiescent until the threshold is again exceeded.

1.22 As described previously, the tone oscillator gating circuits are inhibited when the end-of-tape position is reached. They are also inhibited when the system is in STANDBY mode.

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TABLE 1-1

GENERAL SYSTEM CHARACTERISTICS

Maximum recording (typing) speed	10 characters/second (120 wpm)
Maximum transmitter keying rate	25 characters/second (300 wpm)
Average transmitter keying rate	5 characters/second (60 wpm)
Recording tape	1/2-inch (16 mm), sprocket-driven, 5-track, Mylar base
Maximum message length	3600 characters (including LINE FEED, CARRIAGE RETURN LETTERS, FIGURES, and SPACE characters)
Tape stepping	.060-in./character, 14-millisecond interval
Transmitter tone frequencies	Baud 1: 1400 \pm 5 cps Baud 2: 1500 \pm 5 cps Baud 3: 1600 \pm 5 cps Baud 4: 1700 \pm 5 cps Baud 5: 1800 \pm 5 cps
Recording pulse width	0.5 millisecond
Recording levels	-4 V (1), -12 V (0)
Playback amplifier gain	60 db

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SECTION II

OPERATION

2.1 Operating Controls and Indicators

2.2 The operating control and indicators, and their functions, are listed and described in Table 2-1. All system functions are controlled from the keyboard of the modified IBM electric typewriter. The keyboard is illustrated in Figure 2-1. Special system functions which are performed by certain keys and switches on the typewriter are also identified in the illustration.

2.3 Preparation for Use

2.4 To prepare the system for operation, proceed as follows:

- a. Adjust the carriage pressure lever to the A, B, or C position.
- b. Connect typewriter line cord to source of 115-volt 60-cps power. Set SYSTEM POWER (OFF/ON) switch to OFF. Set SYSTEM CONTROL to STANDBY (impression indicator dial at 4).
- c. Connect P101 on control unit cable to J101 (special connector) on underside of modified IBM typewriter.
- d. To record a message, follow instructions of paragraph 2.6. To transmit a message, follow instructions of paragraph 2.8.

2.5 Message Recording

2.6 To record a message, proceed as follows:

- a. Prepare system for operation in accordance with instructions of paragraph 2.4. Set SYSTEM POWER to ON.
- b. Set SYSTEM CONTROL switch to RECORD (impression indicator dial at 10).

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c. If white light under keyboard is not on, press FUNCTION (SET) switch and wait for white light to come on. If white light is initially on, proceed to step d.

NOTE

Never begin recording until white light is on. The time required for white light to come on is determined by position of tape loop; when FUNCTION switch is pressed, tape steps at rate of 50 steps/second. Maximum time for full cycle of 18-foot tape loop is therefore 72 seconds (3600/50).

d. Press LETTERS KEY eight or more times. White light should go out.

NOTE

When white light is on, recording head is over tape splice and the first seven or eight characters may not be recorded properly.

e. Press LINE FEED (Key 42), CARRIAGE RETURN, and either LETTERS (Key 40) or FIGURES (Key 41), depending upon whether first character in message is a letter or a numeral, respectively.

NOTE

Because the receiving equipment uses a teletype printer to decode the message, certain precautions must be observed during the recording process:

- (1) Always press the LETTERS key when changing from numerals to letters;
- (2) Always press the FIGURES key when changing from letters to numerals;
- (3) Always press both CARRIAGE RETURN and LINE FEED keys at the end of each line in the message;
- (4) If a teletype printer is to be used, make certain left and right margin stops on typewriter are not more than 76 spaces apart. This is the maximum line width on standard teletype printers;
- (5) The typewriter SHIFT keys have no system function; teletype printer at receiving station will type all capital letters;
- (6) To type and record figures, the following keys can be utilized

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in either upper or lower case. (For key position reference numbers, refer to Drawing 100-1-10-015.)

<u>Figure</u>	<u>Type Key No.</u>	<u>Symbol</u>
1	1	Q
2	3 or 5	2, W
3	7 or 9	3, E
4	11 or 13	4, R
5	15 or 17	5, T
6	19 or 21	6, V
7	23 or 25	7, U
8	27 or 29	8, I
9	31 or 33	9, O
0	35 or 37	0, P

(7) Note that the lower case "L" cannot be used for numeral "1" as in normal typing; to record a "1", press FIGURES then letter "Q";

(8) Note that if keys 3, 7, 11, 15, 19, 23, 27, 31, or 35 are utilized to type figures in upper case, the typed text will indicate symbols such as @, #, \$, %, etc. However, the proper code corresponding to the figure (2, 3, 4, etc.) will be properly recorded;

(9) The tape cannot be back-spaced to correct errors; to correct a typing mistake, either recycle tape by pressing FUNCTION switch and re-record the entire message, or indicate the error in the message and type the correction.

f. Type the message, observing all the precautions given above. Type at a steady rhythm, at a rate not more than 100 words per minute.

NOTE

To prevent recording errors, typing speed must be less than 10 characters per second, and any two successive characters must be separated by an interval of at least 1/10 second.

g. After the entire message has been typed, press the FUNCTION (SET) switch and wait for end-of-tape (white) light to come on.

Leave SYSTEM CONTROL switch in RECORD position until white light comes on. This ensures that any previously recorded data beyond the end of the new message will be erased during the reset cycle.

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NOTE

If the message length exceeds 3600 characters, including all LINE FEED, CARRIAGE RETURN, FIGURES, LETTERS and SPACE characters, white light will come on and power will be disconnected from the typewriter motor when 3600 character codes have been recorded. If this occurs, message must be shortened and re-recorded, or transmitted in two parts. To restore power, the FUNCTION must be depressed. However, the system will now erase previously recorded information if typing is continued. If the entire 3600 character space is used, it is important to note that the last one or two characters typed by the machine may not be recorded on the tape. This occurs because of inertia in the cam which actuates the type bars, allowing the cam to continue rotating for a brief time after the recording function has been inhibited.

2.7 Message Transmission

2.8 To transmit a message after recording, proceed as follows:

- a. Make certain white light under right section of the typewriter keyboard is on, indicating that tape is at the index (end-of-tape) position.
- b. Set SYSTEM CONTROL switch to STANDBY (impression indicator dial at 5).
- c. Remove dummy plug from J501 on underside of modified telephone instrument. Connect P501 on transmitter cable to J501 on telephone.

CAUTION

Dummy plug must be replaced in J501 to restore normal operation of telephone after system use.

- d. Initiate the call. When receiving station indicates proper levels have been established, proceed to step e.
- e. Set SYSTEM CONTROL switch to TRANSMIT (impression indicator dial at 0) and continue conversation. Observe that

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white light goes out almost immediately, indicating that transmission has begun.

f. Continue conversation until red light under keyboard comes on, indicating that the entire message has been transmitted.

NOTE

If white light comes on before the red light, this indicates end of tape has been reached due to the entire 3600 character spaces being used in the message; the system will automatically lock out any further transmission.

g. Unless message is to be re-transmitted, when red light comes on set SYSTEM CONTROL switch to STANDBY (impression indicator dial at 5), complete the conversation, hang up telephone, and turn SYSTEM POWER switch to OFF. If message is to be re-transmitted, leave SYSTEM CONTROL switch in TRANSMIT and SYSTEM POWER switch ON; proceed to step h.

NOTE

If SYSTEM CONTROL switch is left in TRANSMIT position after red light comes on, tape will continue to advance as long as conversation is continued, until white light comes on; the system will then lock out further transmission.

h. To re-transmit the message, when red light comes on press the FUNCTION (SET) switch. Continue conversation. After end-of-tape (white) light comes on, automatic re-transmission will begin. Continue conversation until red light comes on again. Repeat step g.

NOTE

If white light comes on before red light, indicating that message fills the entire tape, it will be necessary to press FUNCTION switch to initiate re-transmission cycle.

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2.9 Erasing the Tape

2.10 To erase a recorded message from the tape loop without recording a new message, proceed as follows:

- a. Prepare the system for operation in accordance with paragraph 2.4. Set SYSTEM POWER switch to ON, and SYSTEM CONTROL switch to RECORD (impression indicator dial at 10).
- b. Press FUNCTION (SET) switch and wait for white light to come on.
- c. Press SPACE bar until white light is extinguished.
- d. Again, press FUNCTION (SET) switch and wait for white light to come on. Tape is now completely erased.

NOTE

The method of erasing used in this system provides maximum security. Because the tape is magnetically saturated in the reverse direction, no residual signal information can remain on the tape after erasing.

2.11 Continuous Transmission

2.12 Provision is made in the system for continuous transmission of a tape recorded message over the telephone circuit. It is important to note, however, that this mode of operation does not provide security of transmission. The coded tone bursts are not masked by the voice as in normal transmission and, therefore, can be detected more easily. In the continuous transmission mode, the message is transmitted at a constant rate of 25 characters per second. To operate the equipment in the continuous mode, proceed as follows:

- a. Record the message in the normal manner, in accordance with paragraph 2.6.
- b. Press FUNCTION (SET) switch on typewriter and wait for white end-of-tape light under keyboard to come on.

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- c. Initiate call to receiving station. When receiving station is ready to receive message, proceed to step d.
- d. Set SYSTEM OPERATION switch to TRANSMIT (impression indicator dial at 0).
- e. Lift red safety cover on toggle switch on front panel of transmitter (unit 100-1-33-001). Set toggle switch to up position. This initiates continuous transmission.
- f. Watch for red end-of-message light under keyboard to come on. This indicates that the entire message has been transmitted. When red light comes on, set transmitter toggle switch to down position.
- g. Press FUNCTION switch and wait for white light to come on. To re-transmit the same message, set transmitter panel switch up and repeat steps e and f.
- h. To shut down operation, hang up telephone and set SYSTEM POWER switch on typewriter to OFF.

NOTE

Always make certain transmitter keying switch is off (down) and red safety switch cover is down after operation in the continuous transmission mode. The continuous keying switch must be off in order to operate the system in the normal manner.

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TABLE 2-1

OPERATING CONTROLS AND INDICATORS

CONTROL OR INDICATOR	TYPEWRITER NOMENCLATURE	SYSTEM FUNCTION
SYSTEM POWER switch	OFF/ON	Controls 115 VAC 60 cps main power to typewriter motor and system power supply
SYSTEM CONTROL switch	Impression indicator (dial calibrations 0 to 10)	Selects system mode of operation: STANDBY (dial at 5), RECORD (dial at 10), and TRANSMIT (dial at 0)
FUNCTION switch	SET (tab set lever)	Spring loaded switch; when pressed, initiates fast-stepping action of tape control mechanism; causes tape loop to return to index (end-of-tape) position
END OF MESSAGE indicator (red light)	None	Located under left hand section of typewriter keyboard; in TRANSMIT mode, lights when all recorded message characters have been transmitted.
END OF TAPE indicator (white light)	None	Located under right hand section of typewriter keyboard; in <u>all</u> modes, lights whenever tape loop is in index (end-of-tape) position
SPACE	Space bar	In addition to normal typewriter function, generates SPACE teletype code
CARRIAGE RETURN	RETURN	In addition to normal typewriter function, generates CARRIAGE RETURN teletype code
FIGURES	1/4, 1/2 (Key No. 41)	In addition to normal typewriter function, generates special FIGURES teletype code

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TABLE 2-1 (cont'd)

CONTROL or INDICATOR	TYPEWRITER NOMENCLATURE	SYSTEM FUNCTION
LETTERS	?, / (Key No. 40)	In addition to normal type- writer function, generates special LETTERS teletype code
LINE FEED	", ' (Key No. 42)	In addition to normal type- writer function, generates special LINE FEED teletype code

NOTE: The following typewriter keys and controls perform normal typewriter functions but do not generate a teletype code nor perform any system function:

RIBBON
CLEAR
MAR REL
MAR SET
TAB KEY
BACK SPACE
LOCK
SHIFT

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SHEET 6 OF 6

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REVISIONS

SYM	DESCRIPTION	DATE/CHK
	① FUNCTION SWITCH (TAB SET LEVER)	
	① FIGURES	
	① CARRIAGE RETURN	
	① SYSTEM POWER	
	① LINE FEED	
	① LETTERS	

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① SYSTEM CENTER SWITCH (IMPRESSION INDICATOR)

INDICATES KEY POSITION TYPICAL

① INDICATES SPECIAL FUNCTIONS

① SHEETS NO. 1-5 ARE FOR REQUIREMENT OF THE BASIC TYPEWRITER

NOTES: UNLESS OTHERWISE SPECIFIED -

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PART NO. _____

DESCRIPTION

ITEM

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
ALL DIMS ARE IN INCHES
TOLERANCES-DECIMAL

± .XX ± .XXX

DATE

SCALE

DWG NO.

100-1-10-015

SHEET 6

SIZE B

TITLE

TYPEWRITER KEYBOARD

FIG. 2-1

NEXT ASSY.

APP. #

25X1

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100-1-10-015		A	REV.	SHEET 1 OF 5 SHEETS	TITLE	Rev. A		
						Paragraph No.	Change	Authorization
Typewriter Specification						Paragraph 2.3.2	Line Feed Key changed from position 32 to 42. Figure Key Changed from position 36 to 41	JTC 5/9/61
							Special note regarding space bar added.	
						Paragraph 3.4	Output connections changed from connector to flying leads.	JTC 5/9/61
						Paragraph 2.7	Paragraph 2.7 added.	JTC 5/9/61
						Figure 1	Figure 1 revised to show new positions of figures and line feed keys.	JTC 5/9/61
<div style="display: flex; justify-content: space-between;"> <div> <div>Date 2-1-61</div> <div>5-17-63</div> </div> <div> <div>Prepared</div> <div>Approved</div> <div>Approved</div> </div> </div>								

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100-1-10-015

Typewriter Specification

1.0 SCOPE

This specification describes a modified electric typewriter model B-112 originally manufactured by the International Business Machine Corporation. Figure 1 shall be included as part of this specification.

2.0 MECHANICAL

- 2.1 Color - The typewriter shall be of the standard color, Dove grey with grey key buttons.
- 2.2 Size - the outside physical dimensions shall be those of a standard model B unmodified electric typewriter in every respect except an increase in total height of 1/8" is permitted if required.
- 2.3 Keyboard - The typewriter shall be internally modified so as to produce the 5-unit CCIT telegraph code for any letter or figure as each corresponding key is depressed in upper or lower case. The code is listed as follows in binary notation.

Letter or Figure	Code	Key Position Number
A	11000	2
B	10011	20
C	01110	12
D	10010	10
E	10000	9
F	10110	14
G	01011	18
H	00101	22
I	01100	29
J	11010	26
K	11110	30
L	01001	34
M	00111	28
N	00110	24
O	00011	33
P	01101	37
Q	11101	1
R	01010	13
S	10100	6
T	00001	17
U	11100	25
V	01111	16
W	11001	5
X	10111	8
Y	10101	21
Z	10001	4

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100-1-10-015

100-1-10-015	A	REV.	TITLE	Typewriter Specification	2.3.1 Continued																									
					<table border="1"> <thead> <tr> <th>Letter or Figure</th> <th>Code</th> <th>Key Position Number</th> </tr> </thead> <tbody> <tr><td>2</td><td>11001</td><td>3</td></tr> <tr><td>3</td><td>10000</td><td>7</td></tr> <tr><td>4</td><td>01010</td><td>11</td></tr> <tr><td>5</td><td>00001</td><td>15</td></tr> <tr><td>6</td><td>10101</td><td>19</td></tr> <tr><td>7</td><td>11100</td><td>23</td></tr> <tr><td>8</td><td>01100</td><td>27</td></tr> <tr><td>9</td><td>00011</td><td>31</td></tr> <tr><td>0</td><td>01101</td><td>35</td></tr> </tbody> </table>	Letter or Figure	Code	Key Position Number	2	11001	3	3	10000	7	4	01010	11	5	00001	15	6	10101	19	7	11100	23	8	01100	27	9
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100-1-10-015		A	REV.
SHEET 4 OF 5 SHEETS		TITLE	
TYPEWRITER SPECIFICATION			
4.0 GENERAL			
4.1 Speed - The maximum coding speed shall be 10 codes per second.			
4.2 Audio Noise Level - The audio noise level shall be no greater than that during normal manual operation of the typewriter.			
4.3 Manufacturers Nameplate - A manufacturer's nameplate bearing the <input type="text"/> specification number 100-1-10-015, Revision 25X1 and the manufacturer's part number shall be included on the underside of the typewriter.			
Date 12-1-61			
Prepared			
Approved			
Approved			

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SECTION III

PREVENTIVE MAINTENANCE

3.1 General

3.2 The preventive maintenance requirements for the system will be determined primarily by the extent of its operational use. The following paragraphs describe the preventive maintenance procedures and the recommended intervals for their performance.

3.3 Typewriter Cleaning

3.4 The modified IBM typewriter used with the system should be cleaned and adjusted periodically in accordance with the manufacturer's instructions. Excess eraser dust or other types of dirt can impair operation of the mechanical coding mechanism, and for this reason the machine should be cleaned regularly if it is used as a standard machine for regular office work. If possible, typists should be cautioned to use care in erasing errors, and it is recommended that the machine be kept covered when not in use.

3.5 Tape Unit Cleaning

3.6 In normal system use, magnetic oxide from the tape will gradually build up on the record/reproduce head and on the tape guide pins, rollers, and sprocket. The oxide deposits must be removed at periodic intervals (at least every three months; more often if the system is operated extensively) to ensure reliable system operation. To clean the unit, proceed as follows:

- a. Remove the cover from the tape unit and power supply assembly. Remove four screws which fasten the tape unit to the mounting plate. Lift out the tape unit.
- b. Remove the four screws which mount the tape bin cover to the tape unit. Remove the cover.

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c. Remove the tape from the sprocket (16) (see Drawing 100-1-31-131) by activating the pressure roller release lever (14).

CAUTION

Whenever possible, avoid touching the oxide surface of the tape.

- d. Release the spring-loaded tape tension pad lever (3). Remove the tape from the guide (5), tension pad (6), Magnetic head (9), and out of the guide slot between the photo-sensor (7) and the light (8).
- e. Keeping the tape loop clear, clean the drive sprocket (16), pressure roller (15), and guide (5). Use a good commercial grade of alcohol and clean cotton swab. Wipe away all excess solvent.
- f. Clean the record/reproduce head with a good quality head cleaner. Utilize a soft cotton swab.
- g. Thread the tape loop back into the unit as shown in 100-1-31-131. Make certain the sprocket teeth are properly meshed with the tape perforations and that the tape is taut where it passes over the head.
- h. Make certain the entire tape loop is properly seated in the tape bin with the oxide (dull side) toward the magnetic head, then replace the tape unit cover. Replace the tape unit on its mounting plate.

3.7 Power Supply Voltages

3.8 The system power supply DC output voltages should be checked periodically to make certain they are within tolerances. All DC

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voltages should measure within 1% of the specified values in all three operation modes (STANDBY, RECORD, TRANSMIT). The +12 V outputs of the power supply are adjustable by means of potentiometers located on the underside of the power supply chassis. Table 4-1 lists the test points at which power supply voltages may be measured.

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SECTION IV

ALIGNMENT AND ADJUSTMENT

4.1 Introduction

4.2 This section provides detailed instructions for alignment and adjustment of mechanical components and electronic circuits in the system. In general, adjustments should not be attempted unless marginal performance has been detected, or defective components have been replaced.

4.3 Test Points and Adjustments

4.4 Test points and adjustments for the system are listed in Table 4.1 and on Drawing 100-1-31-131, respectively

4.5 Preparation and Installation of Tape Loop (Refer to Drawing No. 100-1-31-131)

4.6 The following is a step-by-step procedure to be followed whenever the magnetic tape loop requires replacement. Use only 16-millimeter, single perforated Mylar base magnetic tape. A recommended type is Reeves Soundcraft 16 MM GEA400, or Scotch brand magnetic film LR1189 which will provide increased life by a factor of 15.

CAUTION

Avoid contamination or scratching
of the oxide coating on the tape.

- a. Measure off exactly 720 perforations (18 feet) of tape. Cut the tape 4 perforations beyond this point.

NOTE

The 18-foot length represents a maximum capability of the system, and permits recording of 3600 message characters. If desired, the loop may be made shorter, but not less than 2 feet. Tape length must always be an even multiple of 12 inches.

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- b. Bring the two ends of the tape together, overlapping the excess length so that the perforations are exactly aligned. This ensures correct spacing between the perforations nearest the splice.
- c. Make a diagonal splice, using Minnesota Mining 41-3/4-L type splicing tape or equivalent on the Mylar side of the magnetic tape. Double check the number of tape perforations before installing the tape in the tape unit, since an incorrect number causes gross tape positioning errors. The four extra perforations utilized in making the splice should have been removed in the cutting process.
- d. Holding the tape with the oxide surface up, and the perforations on the bottom edge, count 5 perforations to the right from the splice. Using a sharp instrument, such as an Xactoknife, scrape the oxide as shown in Figure 4-1 to form a transparent window for the photosensor light. Use care to avoid puncturing the transparent Mylar tape backing or scratching the oxide surface except in the desired area. Make certain the entire window area is clear.

CAUTION

If the window extends farther into the tape than 0.2-inch as shown, loss of data can occur on track 1 of the tape.

- e. Remove the cover from the tape unit and power supply assembly. Remove the four screws which fasten the tape unit to the mounting plate. Lift out the tape unit.
- f. Remove four screws which mount the tape bin cover (item 1, 100-1-31-131) to the tape unit. Remove the cover.
- g. Remove the used tape loop (13) from the tape bin (18). Release the tape tension pad lever (3). Manually disengage pressure roller (15) from drive sprocket (16) by activating the pressure roller release lever (14). Remove the entire tape loop from the unit.

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- h. Hold the pressure roller away from drive sprocket and fit the new tape loop over the drive sprocket, making certain the Mylar side is against the sprocket so that the oxide surface of the tape will be facing the record/reproduce head (9). Release the pressure roller.
- i. Thread the tape between the photosensor and guide (7) and the photosensor light (8). Release tape tension pad lever (3) and thread the tape over the record/reproduce head (9) and around the tape guide (5). Thread the left side of the tape loop into the tape bin entrance (17) and out the tape bin exit (2) so that all excess tape is outside the tape unit.
- j. Gently pull on the tape to remove any slack between the drive sprocket and the magnetic head. Check that there are no crimps or binds in the tape and that the tape is still seated properly on the drive sprocket.
- k. Replace the tape bin cover (1). Smooth out the external portion of the tape loop.
- l. To feed the tape loop into the bin, place the system in the TRANSMIT mode and energize the transmitter continuous keying switch. This will cause the tape to advance continuously at 25 steps per second. Carefully guide the tape by hand to prevent binding or crimping. De-energize the transmitter keying switch when the entire tape loop has been fed into the unit, or if any difficulties arise in threading the loop.
- m. Check photosensor alignment (paragraph 4.8) before placing the system in normal operation.

4.7 Photosensor Alignment

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4.8 The photosensor alignment check should be performed after installation of a new tape loop, photosensor light, or photocell.

Perform the check and alignment as follows:

- a. Place the system in STANDBY and press the FUNCTION (SET) switch. Wait for white end-of-tape light under keyboard to come on.

NOTE

If white light does not come on, check photosensor threshold setting (paragraph 4.10).

- b. Remove the tape bin cover (1, Drawing-100-1-31-131).
- c. Visually check the position of the photosensor light beam with respect to the end-of-tape window. The light should be as far to the left of the record/reproduce head (9) as possible, while still allowing all of the light to pass through the window. If alignment is correct, proceed to step e. If adjustment is necessary, perform step d.
- d. To adjust the light, loosen screw (19) and move the photosensor light assembly (8) laterally as required. Loosen screw (11) and move the guide and photosensor assembly (7) to maintain proper alignment between the light beam and the photocell. Tighten the two screws (11, 19).
- e. Replace the tape bin cover (1). If alignment was performed, recycle the tape to make certain the end-of-tape sensing channel is operating properly.

4.9 Photosensor Threshold Setting

4.10 The photosensor threshold setting should be checked whenever the white end-of-tape light under the keyboard fails to light at the

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proper time, or whenever one or more component parts of the end-of-tape sensing channel have been replaced. To check and adjust the threshold, proceed as follows:

- a. Place the system in RECORD mode and make certain the tape loop is not at the end-of-tape position.
- b. Connect a VTVM, set for positive DC voltage measurement, to TP 10 on terminal board TB6 in the control unit. The voltmeter should read -7 VDC.
- c. Press the FUNCTION (SET) switch and wait for tape to advance to end-of-tape position. The white light under the right section of the keyboard should be on and the voltmeter should indicate +4 VDC. If voltage is correct, disconnect voltmeter. If voltage is incorrect, perform step d.
- d. With VTVM connected to TP10 in control unit, adjust position of guide and photosensor assembly (7, Figure 4-2) by loosening screw (11), to obtain the reading specified in step c. Do not disturb the position of the photosensor light (8).
- e. Disconnect VTVM from TP 10 and replace all unit covers.

4.11 Record Timing Adjustment

4.12 The following procedure adjusts the timing of the input gating circuits in the record channel with respect to the tape stepping action. Proper timing is necessary to ensure that the signals to be recorded are not applied to the record head until the tape has reached optimum speed during each step.

- a. Remove control unit cover and place the system in RECORD mode.

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b. Connect the signal input of an oscilloscope through a 10X probe to TP14 in the control unit. Connect the external trigger input of the scope to TP12. Set the oscilloscope controls as follows:

External Trigger - Negative
Horizontal Deflection - 1 millisecond/cm

c. Press the FUNCTION (SET) switch. Adjust the oscilloscope for monitoring the 0.5-millisecond pulse at TP14. Check the position of the trailing edge of the pulse with respect to the trigger (i. e, start of time base). Adjust R105 on terminal board TB7 so that the trailing edge of the 0.5-millisecond pulse is displaced 9.3 centimeters (9.3 milliseconds) from the trigger.

d. Disconnect the oscilloscope and replace control unit cover.

4.13 Playback Channel Output Threshold Adjustment

4.14 The following procedure adjusts the threshold level for the Schmitt trigger stage at the output of each of the five playback channels.

a. Place the system in RECORD mode and record a series of LETTERS symbols (typewriter key No. 40). The code for this symbol is 11111, so that a pulse will be recorded on all five tape tracks each time the key is pressed.

b. Connect the signal input of an oscilloscope to TP1 in the control unit. Set the horizontal sweep speed of the oscilloscope to 10 milliseconds per centimeter.

c. Place the system in TRANSMIT mode and energize the continuous keying switch on the transmitter. Monitor the oscilloscope for the presence of continuous pulses at TP1 until the red end-of-message light comes on. The pulses should dis-

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appear at end of message.

d. If abnormal indication is obtained in step c, adjust potentiometer R22-1 and repeat the procedure until correct indication is obtained.

e. Change the oscilloscope signal input connection from TP1 to TP2. Repeat step c and adjust R22-2 if required. Repeat the procedure with the oscilloscope connected to TP3, TP4, and TP5, adjusting R22-3, R22-4, and R22-5 as required.

f. Erase the tape, then set the transmitter for continuous keying and repeat the checks at all five test points. No pulses should be observed. If occasional pulses occur, this is an indication that the threshold setting for that channel is too low.

4.15 Tape Drive Adjustment

4.16 The solenoid-actuated arm which releases the ratchet wheel and allows the tape to advance one step may require adjustment if some part of the drive mechanism is replaced. This adjustment is performed by loosening the two solenoid mounting screws and repositioning the solenoid, thus changing the position of the arm with respect to the ratchet wheel. Improper adjustment is evidenced by one or more of the following:

- (1) The tape advances occasionally when no stepping pulse is present;
- (2) The tape occasionally advances more than one step, resulting in loss of a character;
- (3) The tape occasionally fails to advance when a stepping pulse is present.

4.17 Transmitter Adjustments

4.18 The following paragraphs provide instructions for measuring and adjusting the transmitter operating parameters.

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Equipment Required

H. P. 200 CD or Equivalent

Tektronics 531A Oscilloscope

Tektronics Type "B" Pre-Amp

Frequency Counter

Ballantine Mod. 320 True R. M. S. V. T. V. M.

Single Track Tape Recorder and Section of Tape Containing Four
One Minute Verbal Passages

H. P. 410B V. T. V. M.

Audio Attenuator HP 350B or Equivalent

Parallel Capacitors Totaling 12,500 UF

4.19 Limiter Adjustment

- a. Adjust R2-2 and R2-4 (TB1) for plus and minus 0.7 VDC respectively as measured at wiper.
- b. Inject a 500 cps signal at the transformer side of R2-1, and with scope observe TP-2.
- c. As the amplitude of the 500 cps signal is increased, symmetrical clipping should occur at TP-2 when 1 VP-P is reached. If this is not the case, make the necessary minor adjustments to R2-2 and R2-4 to achieve symmetrical clipping at 1V P-P.

4.20 CW Gain Measurements

- a. Input and output leads should be unterminated.
- b. Inject a 500 cps, 165mv R. M. S. CW signal at TP-6 (Point A).
- c. Measure level of AC signal at points B through F (refer to Table 4-1, Col. 1-3).

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4.21 Determining AGC Threshold and Midrange AGC

- a. Connect the system as shown in Figure 4-2.
- b. Using VTVM, observe the DC voltage present at base of Q1-2, TB-1. This voltage should be approximately +4.5 V with the tape recorder not running.
- c. Start the tape recorder and feed verbal passages into the system. The voltage at the base of Q1-2, TB-1 will undergo excursions toward zero. Adjust the H. P. attenuator so that approximately five percent of these excursions actually reach zero voltage. This level of input is the lower threshold of AGC.
- d. Remove 10 db from H. P. attenuator. The level into the system will now correspond to midrange AGC. Note the attenuator setting and tape recorder output level, both of which will remain in this condition throughout tests requiring tape recorder input.

4.22 Average R. M. S. Voice Levels

- a. Using Point TP-6 as an example, the average RMS voice level is measured as follows:
 - (1) Position tape at beginning of first verbal passage.
 - (2) Connect Ballantine AC input to test point 6.
 - (3) Set H. P. 410B to -1 VDC scale, and Ballantine to voltage range appropriate for voltage to be measured. (Refer to Table 4-1, Col. 4).
 - (4) Play tape through first verbal passage (approx. 1 minute) and note the highest magnitude of -DC voltage read on HP 410 B during this period.

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- (5) Adjust output amplitude of audio generator to give same -DC voltage level as obtained in Step 5 above.
- (6) Record the RMS voltage indicated by the Ballantine.
This voltage is equal to the average RMS voice level.

b. Perform Steps 1 through 6 above for all points called in Column I of Table 4-1.

4.23 Transmitter Keying Threshold Adjustment

- a. Compute the following:
(Average RMS voice level recorded for Point F) x 7.1.
- b. At Point F, inject a 500 cps signal of P-P amplitude equal to result computed in Step "a" above.
- c. Observe Q4-3b with scope, and adjust R4-12 for equal amplitude of full-wave rectified peaks.
- d. Place XMIT-STBY switch in XMIT position and adjust R4-18 (TB2) to the point where the tape unit just begins to advance. This setting of R4-18 should give an average keying rate of 150 characters per passage for the four verbal passages on the tape.

4.24 Measuring Keying Rate

(TRANSMIT-STANDBY Switch in TRANSMIT Position)

- a. Connect electronic counter to Q5-7b (TB-2) and adjust counter so that it will advance one count per one negative input pulse.
- b. Play the four verbal passages on the tape and record the total number of counts registered during this time.
- c. Divide the results of Step "b" above by four. This should be equal to 150 ± 30 .
- d. Fine adjustment of R4-18 (TB-2) can be made to increase or decrease keying rate at this time.

4.10

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SECRET**NOT RELEASABLE TO FOREIGN NATIONALS****4. 25 Pulse Linearity and Injection Level**

- a. Place mode switch to TRANSMIT position. Step tape unit off end-of-tape (white light off). Remove P303 from tape unit.
- b. Turn transmitter continuous keying switch to ON.
- c. Apply -12VDC to anode of CR7-7 (TB-2).
- d. Monitor TP-5 and adjust R6-7 and R6-17 (TB-2) for linear triangular shaped pulse. The peak to valley ratio of the train of pulses should be 10:1.
- e. Adjust R7-16 (TB-2) for 1.5 V P-P at TP-5.
- f. Compute the following:
$$\frac{\text{Average RMS voice level at TP-1.}}{3}$$
- g. Short junction of C2-10 and R2-15 (TB-1) to ground.
- h. Monitor TP-1 with oscilloscope and adjust R6-25 TB-2 for P-P value computed in Step "f".
- i. Repeat Steps c, e, g, and h for channel 2, 3, 4, and 5 on TB-3.

4. 26 System Modification for 220-Volt Operation

4. 27 The following paragraphs provide instructions for changing the system from 110-volt AC to 220-volt AC operation.

4. 28 Tape Drive Motor Replacement

To replace the 110-volt tape drive motor with a 220-volt motor, proceed as follows (refer to Drawing No. 100-1-31-131):

- a. Unsolder all motor and capacitor leads.
- b. Loosen small gear (1) on the motor shaft (3).

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- c. Remove two motor mounting screws (2) and lift out the motor (3).
- d. Remove capacitor (4) and capacitor holding clip (5).
- e. Install new 220-volt motor and replace mounting screws.
- f. Mesh gear (1) and tighten gear set screw. Apply Loctite sealing compound to set screw before locking.
- g. Replace capacitor (4) and clip (5).
- h. Rewire motor and capacitor.

4. 29 Typewriter Motor and Starting Capacitor Replacement

(To be supplied - may be factory modification)

25X1

4. 30 Lamp Resistor Replacement

For 220-volt operation, resistors R139, R140, R141 and R142 in the red and white indicator lamp circuits of the typewriter must be replaced. The original 22K resistors are replaced with resistors. For access to the resistors, remove four screws from the bottom panel of the typewriter and lower the panel.

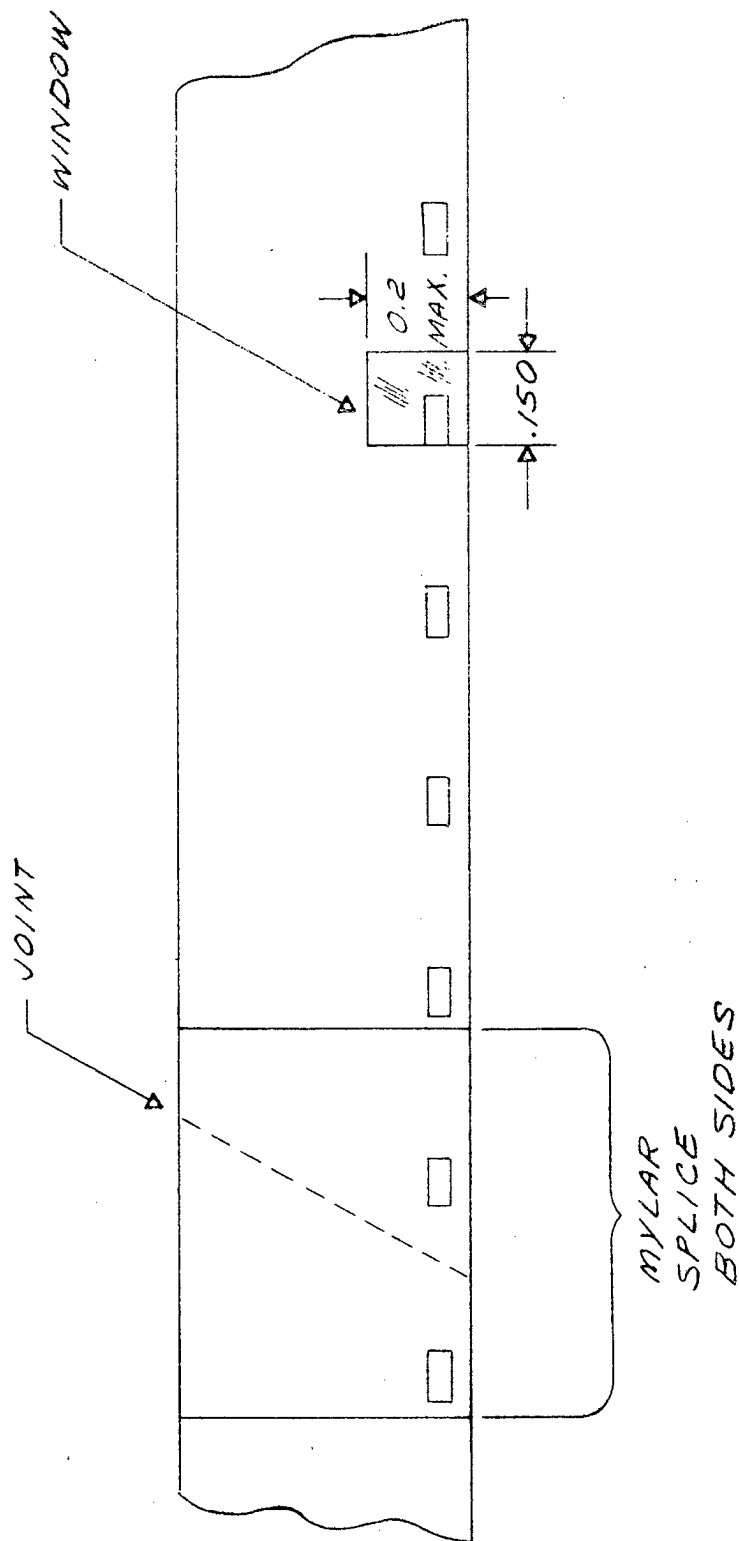
4. 31 Power Supply Modification

The DC power supply provided with the system has a built-in provision for 220-volt operation. The changeover from 110-volt to 220-volt operation is made by changing connections at four terminals of a terminal board on the underside of the unit. (See Figure 4-3.)

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SECRET

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NOTE: (1) MYLAR SPLICE
APPROXIMATELY 1/2"

FIGURE 9-1, LOCATION OF PHOTOSENSOR WINDOW
IN TAPE LOOP

SECRET

SECRET**NOT RELEASABLE TO FOREIGN NATIONALS**TABLE 4-1
TEST POINTS

LOCATION	TEST POINT NO.	FUNCTION
Control Unit (accessible behind door in side panel)	TP 1	Playback output - Channel 1
	TP 2	" " Channel 2
	TP 3	" " Channel 3
	TP 4	" " Channel 4
	TP 5	" " Channel 5
	TP 6	-4 VDC
	TP 7	+12 VDC
	TP 8	-12 VDC
	TP 9	Ground
	TP 10	Photo-sensor threshold
	TP 11	Normal step AND gate
	TP 12	Solenoid Driver Output
	TP 13	+24 V ground
	TP 14	0.5 ms one-shot output
Transmitter Unit (test points recessed in top panel)	TP 1	Transmitter output
	TP 2	Emitter Q2-1 (audio)
	TP 3	Keying threshold output
	TP 4	20-ms one-shot No. 1
	TP 5	Composite tone output
	TP 6	Transmitter audio input
	TP 7	+12 vdc
	TP 8	-12 vdc
	TP 9	Ground
Power Supply	J1-A	+12 vdc
	J2-D	
	J1-F	-12 VDC
	J1-E	+22 VDC
	J2-D	+6 VDC
	J1-J	DC return
	J2-C	
	J1-L, -K, -M	Ground
	J2-G, -K	

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TABLE 4-2

ADJUSTMENTS

LOCATION	REF. DESIGNATOR	FUNCTION
Control Unit (Terminal board TB7)	R105	Adjusts timing of record pulse relative to tape stepping pulse (9-ms one-shot delay TP 14)
(Terminal board TB6)	R136	Photosensor threshold adjustment (TP 10)
	R22-1, -2, -3, -4, -5	Threshold level for Schmitt trigger at output of each playback channel (input to bit memory TP 1 - TP 5)
Transmitter (refer to detailed alignment procedure paragraph 4-17)		

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SECRET**NOT RELEASABLE TO FOREIGN NATIONALS****TRANSMITTER ADJUSTMENT LEVELS**

TABLE 4-3

Col. 1 Point	Col. 2 Location	Col. 3 CW Level (RMS)	Col. 4 Avg RMS Level
A	TP-6	156 MV	135 MV \pm 2 db
B	Q1-1C (TB-1)	500 MV \pm 2 db 430 mv	450 MV \pm 2 db 210 mv
C	Transformer Side R2-1 (TB-1)	670 mv \pm 2 db 680 mv	600 mv \pm 2 db 690 mv
D	Q2-1b (TB-1)	160 mv \pm 2 db 160 mv	145 mv \pm 2 db 76 mv
E	TP-1	180 mv \pm 2 db 270 mv	150 mv \pm 2 db 140 mv
F	Q4-1b (TB-2)	80 mv \pm 2 db 125 mv	40 mv \pm 2 db 35 mv

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SECRET

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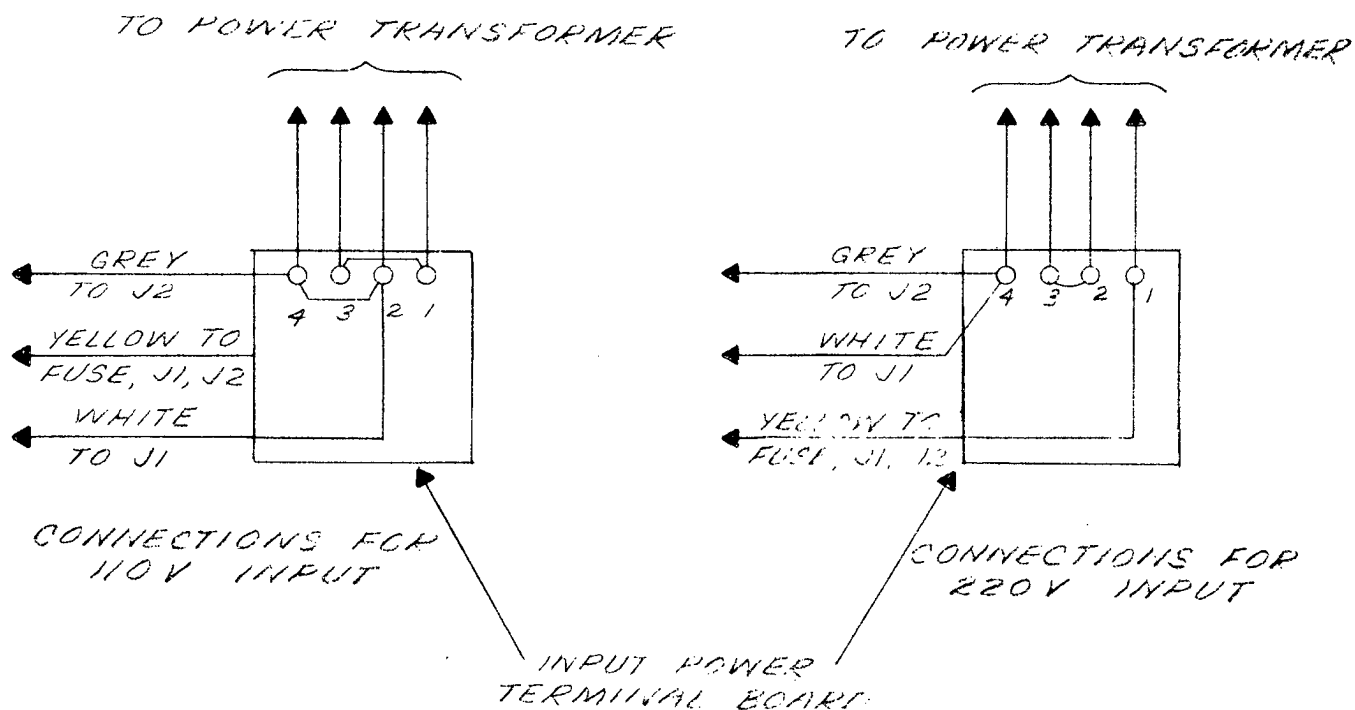


FIGURE 4.3, - INPUT POWER CONNECTIONS FOR DC POWER SUPPLY

SECRET

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SECRET

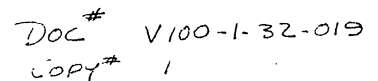
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APPENDIX

SECRET

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SHEET / OF / SHEETS REV.

TITLE

TAPE UNIT

Prepared

Approved

Approved

8-4-62

N.A.

8-21-62

5-17-63

(END)
(ITEM)

QUAN.

PART NUMBER

DESCRIPTION

CIRCUIT SYMBOL NO.

ITEM

REV.

✓	1	100-1-31-100	TAPE TRANSPORT		1	
✓	1	100-1-31-124	COVER		2	
✓	1	100-1-31-125	BASE PLATE		3	
✓	1	100-1-31-130	INSTALLATION DRAWING		4	
✓	1	100-1-10-037	POWER SUPPLY - (SPEC)		5	
REF.		100-1-31-131	TAPE UNIT, INSTRUCTIONS		6	
					7	
	15	ANSO 763Z RS	SCREW, FLT. HD. - 6.32 x .312 LONG		8	
					9	
					10	
					11	
					12	
					13	
					14	
					15	
					16	

Prepared		6-1-62		N.A.		SHEET / OF / SHEETS		REV.		TITLE	
Approved		8-21-42		100-1-31-100						TAPE HEAD ASSY.	
Approved											
QUAN.	PART NUMBER	DESCRIPTION				CIRCUIT SYMBOL NO.		ITEM		REV	
1	100-1-31-091	MOUNTING PLATE						1			
2	100-1-31-090	ROLLER						2			
1	100-1-31-144	PRESSURE PAD BRACKET						3		A	
								4		A	
1	PU-101	TAPE HEAD - (SPEC)						5		25X1	
								6			
								7			
2	AN507-440B-9	SCREW FLAT HD. 4.40 X .25 LONG						8			
2	MS3520B-20	SCREW PAN HD. 4.40 X 1.00 LONG						9			
2	MS3520B-12	" " " 4.40 X .250 LONG						10			
2	5100-12	RETAINING RING. WALDES KOHNDOOR INC. LONG I. CITY, N.Y.						11			
								12			
2	NAS620-4L	WASHER, FLAT - NO. 4						13			
2	MS35337-21	WASHER, SPRING LOCK - NO. 4						14			
								15			
								16			

QUAN.		PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV
1	1	100-1-31-098	MOUNTING PLATE		1	
1	1	-133	TERMINAL BOARD, - TAPE UNIT		2	B
2	2	-101	SPACER, GEAR PLATE		3	
2	2	-102	SPACER, DOWEL		4	
					5	
1	1	-104	GEAR, PLATE		6	
1	1	-105	TAPE BIN & COVER		7	
1	1	-119	PHOTO CELL ASSY		8	
1	1	-096	TAPE HEAD ASSY		9	
1	1	-108	SHAFT DRIVE SPROCKET		10	
1	1	-115	SLIP CLUTCH ASSY		11	
1	1	-110	SHAFT, INTERMEDIATE		12	
1	1	-111	SHAFT, PRESSURE ROLLER ARM		13	
1	1	-002	PRESSURE ROLLER		14	
1	1	-003	ARM, PRESSURE ROLLER		15	
1	1	100-1-31-004	SHAFT, PRESSURE ROLLER		16	

SHEET 4 OF 6 SHEETS REV.

TITLE

100-1 TAPE
TRANSPORT ASSY.

Prepared		6-14-62		
Approved				
Approved				
QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
✓ 1	100-1-31-007	SPROCKET, DRIVE		17
✓ 1	" - 112	CONNECTOR PLATE		18
1	" - 128	SHIELD		19
1	100-300-18-9	COMPONENT CLIP - N. HOLLYWOOD, CALIF. ATLEE		20
1	1712-C3901	MOTOR - 1/50 H.P. 3200 RPM - SKURKA-LANGDON L.A. CALIF.		21
1	RP 3301	CAPACITOR - MALLORY, INDIANAPOLIS, IND.		22
1		16 T NYLON GEAR		23
				24
				25
				26
				27
				28
				29
				30
				31
				32

PARTS LIST

PL 100-1-31-100 C
SHEET 5 OF 6 SHEETS REV.

Prepared		6-14-62		100-1 TAPE	25X
Approved				TRANSPORT ASSY.	
Approved					
QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	
4		SCREW-SKT HD. 4-40 X .312 LONG	ALLEN	33	
3		" " " 6-32 X .562 LONG	MFG. CO.	34	
3		" " " 8-32 X .500 LONG	ALLENTOWN PA.	35	
2		" " " 8-32 X 1.875 LONG		36	
2		SET SCREW, SKT HD, 6-32 X .250		37	
8	MS20365-490A	LOCK NUT - 4-40		38	
6	22NTM-82	LOCK NUT - 8-32; UNION, N. J.	ESNA	39	
20	NAS620-4L	WASHER, FLAT - NO. 4		40	
3	NAS620-6L	" " - NO. 6		41	
6	NAS620-8L	" " - NO. 8		42	
3	MS35337-22	WASHER, SPRING LOCK - 6-32		43	
16	MS35208-15	SCREW, PAN HD. - 4-40 X .312 LONG		44	
3	AN507440R-8	SCREW, FLAT HD. - 100°, 4-40 X .250 LONG		45	
2	MS35216-4	SCREW, PAN HD. - 2-56 X .31 LONG		46	
1	5100-18	RETAINING RING - WALDES KOHINOOR INC.		47	
		LONG ISLAND CITY, N.Y.		48	

PARTS LIST

PL 100-1-31-100 C
SHEET 6 OF 6 SHEETS REV.

25X1

Prepared		6-1462		TITLE		25X1
Approved				100-1 TAPE		
Approved				TRANSPORT ASSY.		
QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM		
1	D4BS36P2	GEAR - (36T, 64 D.P.)		49		
1	D4BS64P2	(64T, 64 D.P.)	PERFECT GEAR	50		
1	H46S1A4		& INSTRUMENT	51		
			CORP.			
			INGLEWOOD, CALIF.	52		
3	MS35337-23	WASHER, SPRING LOCK - NO. 8		53		
1	79-012-062-0437	ROLL PIN - ESNA, UNION N. J.		54		
6	SFR3DP	BEARING - NEW HAMPSHIRE BALL BEARINGS		55		
		PETERBOROUGH, N. H.				
	OR			56		
	SR3FRHH	BEARING - M. P. B.		57		
				58		
1	PT02E-12-8P	RECEPTACLE - BENDIX SCINTILLA,		59		
1	PT02E-12-10P	RECEPTACLE - SIDNEY N. Y.		60		
				61		
1	PT06E-12-8S(SR)	CONNECTOR - BENDIX SCINTILLA,		62		
1	PT06E-12-10S(SR)	CONNECTOR - SIDNEY, N. Y.		63		
				64		

PARTS LIST

PL 100-1-31-117

SHEET 2 OF 2 SHEETS REV.

25X1

Prepared	ZA.	7-13-62	TITLE PHOTO CELL ASS'Y	
Approved				
Approved				
QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
REF	100-1-31-118	PHOTO CELL - HEAD LAYOUT		1
1	100-1-31-120	PHOTO CELL - BULB PLATE		2
1	100-1-31-121	PHOTO CELL HOUSING		3
1	100-1-31-122	PHOTO CELL COVER		4
1	100-1-31-123	BULB HOLDER		5
1	CL-604L	PHOTO CELL CLAIREFX CORP. (PL100-1-34-002 ITEM 43)		6
1	CF-12-6A	LIGHT & BASE, T2 } Eldema Corp. (ITEM 41)		7
1	ZK	LAMP HOLDER } El Monte, Calif. (ITEM 42)		8
2	#2-56 x 1/4"	SCREW - PAN HD		9
4	#2-56 x 3/16"	" " "		10
1	#6-32 x 3/16"	SET SCREW - FLAT POINT		11
1	1/8" DIA. x 1/16"	NYLON DISC.		12
(2) REF	#4-40 x 3/8"	SCREW - PAN HD.		13
(2) REF	#4	PLAIN WASHER		14
(2) REF	#4	LOCK WASHER		15

PARTS LIST

PL 100-1-31-135 B

SHEET 2 OF 2 SHEETS REV.

25X1

Prepared

Approved

Approved

1-12-63

TITLE

LAYOUT-PRESSURE ROLLER -
BRACKET ASSY

25X1

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV
1	100-1-31-136	LEVER, ROLLER RELEASE		1	
1	100-1-31-137	LEVER, ROLLER SPRING		2	
1	100-1-31-138	BRACKET, ROLLER SPRING		3	
1	100-1-31-139	SPRING, PRESSURE ROLLER		4	
				5	A
				6	A
2	#4-40NC-2x 5/8"	SCREW, PAN HD.		7	
2	#4-40NC-2	NUT, ESNA.		8	
2	#4	WASHER, PLAIN.		9	
REWORK	100-1-31-003	ARM-PRESSURE ROLLER		10	
REWORK	100-1-31-094	MOUNT-		11	
DELETE	100-1-31-095	SPRING, TAPE TENSION		12	

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25X1

PL	100-1-31-144	A
SHEET 2 OF 2 SHEETS		REV.

Approved

LAYOUT -
PRESSURE PAD BRACKET

[illegible]

PARTS LIST

PL 100-1-32-000 B

SHEET 7 OF 3 SHEETS REV.

TITLE

INPUT UNIT-
PHASE III

Prepared

8-17-62

Approved

Approved

5-17-63

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
1	100-1-32-001	COVER, PLATE.		1	
1	100-1-32-011	SWITCH ARM		2	
1	100-1-32-012	ACTUATING ROD		3	
1	100-1-32-013	ROD BUSHING		4	
1	100-1-32-014	COMPONENT B.D.		5	
1	100-1-32-010	RELAY BRKT		6	
1	100-1-32-015	TERMINAL B.D.		7	
1	100-1-32-016	TERMINAL STRIP		8	B
1	100-1-32-017	BOTTOM PLATE, REWORKED		9	B
2	92-1660-26	LOCK NUT - 2-56 ESNA UNION, N. J.		10	
6	NAS43DD-1-6	SPACER		11	
1	MSS1017-1	SET SCREW-2-56 X.125 LONG.		12	
2	NAS620-2	WASHER, FLAT - #2		13	
2	5555-7	SNAP RING - WALDES KOHINOOR INC. LONG ISLAND CITY, N. Y.		14	
				15	
REF	100-1-32-006	SCHEMATIC DIAGRAM, COVER PLATE ASSY.		16	B

PARTS LIST

PL 100-1-32-000 B

SHEET 2 OF SHEETS REV.

TITLE

INPUT UNIT -
PHASE III

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
				17
				18
4	RC20GF223J	RESISTOR - MIL-R-11:22K, 1/2W	R1, R2, R3, R4	19
				20
4	1N458	DIODE - TEXAS INST. DALLAS, TEX.	CR1, CR2, CR3, CR4	21
				22
1	PS109	SWITCH - CENTRAL LAB MILWAUKEE, WIS.	S1	23
				24
4	7538	LAMP HOLDER - DIALCO BROOKLYN, N.Y.		25
2	38H-931	LAMP - NEON, DIALCO RED - BROOKLYN, N.Y.	DS4, DS2	26
2	38H-937	LAMP - NEON, DIALCO CLEAR - BROOKLYN, N.Y.		27
				28
				29
2	VGG2C26.5VD-S12A1	RELAY - ELGIN ADVANCE	K1, K2	30
2	RP-7631G12	RELAY - C.P. CLARE CO. HOLLYWOOD, CALIF.	K3, K4	31
				32

PARTS LIST

PL 100-1-SC-000 B

SHEET 3 OF 3 SHEETS REV.

25X1

TITLE

INPUT UNIT-
PHASE III

Prepared

Approved

Approved

QUAN.

PART NUMBER

DESCRIPTION

CIRCUIT SYMBOL NO.

ITEM

2	MS3520B-19	SCREW, PAN HD - 4-40 X .375 LONG.	33
12	NAS620-4L	WASHER, FLAT - #4	34
6	MS35337-21	WASHER, SPRING LOCK - #4	35
			36
4	AN507-440R-7	SCREW, FLT HD 100° - 4-40 X .437 LONG	37
12	MS20365-440A	LOCK NUT - #4-40	38
			39
2	MS3520B-6	SCREW PAN HD. - 2-56 X .437 LONG	40
2	NAS620-2L	WASHER FLAT - #2	41
2	MS3520B-27	SCREW PAN HD - 6-32 X .500 LONG	42
2	NAS620-6L	WASHER, FLAT - NO. 6	43
2	MS35337-22	WASHER, SPRING LOCK - #6	44
			45
			46
			47
			48

PARTS LIST

PL 100-1-33-000 B

3-13-63

25X1

SHEET 2 OF 5 SHEETS REV.

Prepared

Approved

Approved

TITLE

TRANSMITTER
PARTS LIST

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
1	100-1-33-002	TS-TOP TRANSMITTER		1	B
2	100-1-33-003	TS-BOTTOM TRANSMITTER		2	B
1	100-1-33-009-1	SUPPORT FILTER		3	B
1	100-1-33-009-2	SUPPORT FILTER		4	B
2	100-1-33-005	SUPPORT-CONNECTOR		5	
1	100-1-33-006	PLATE-FILTER		6	
1	100-1-33-007	PLATE-FILTERS		7	
1	100-1-33-008	PLATE-CONNECTOR		8	
1	100-1-33-009	COVER-TRANSMITTER		9	
1	100-1-33-010	BASE PLATE		10	
2	100-1-33-011	HINGE		11	
3	100-1-33-013	SPACER 1.375"		12	
1	100-1-33-014	PLATE-TEST POINT		13	
1	100-1-33-015-1	SUPPORT FILTERS		14	B
1	100-1-33-015-2	SUPPORT FILTERS		15	B
				16	

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PARTS LIST

PL 100-1-33-000 B
SHEET 3 OF 3 SHEETS REV.

Prepared

Approved

Approved

TITLE

TRANSMITTER
PARTS LIST

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
REF.	5-0001	ACI FINISH SPEC		17	B
1	100-1-33-016	TERMINAL BOARD TOP ASSEMBLY NO. 1		18	B
1	100-1-33-017	TERMINAL BOARD NO. 3 ASSEMBLY		19	B
1	100-1-33-018	TERMINAL BOARD NO. 2 ASSEMBLY		20	B
				21	
REF.	100-1-33-019	BLOCK DIAGRAM - TRANSMITTER		22	B
REF.	100-1-33-012	TRANSMITTER, PHASE III, (ELECTRICAL PARTS LIST)		23	B
				24	
				25	
				26	
				27	
				28	
				29	
				30	
				31	
				32	

PARTS LIST

PL 100-1-33-000 B

SHEET 4 OF 5 SHEETS REV.

25X1

Prepared

Approved

Approved

TITLE

TRANSMITTER
PARTS LIST

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
10	1246-18 3/16	RIVET STAND-OFF 6-32 THD 3/16 L	CTC	33
6	22LHA27M-22-62	NUT, ANCHOR FLOATING RT. ANGLE 6-32	ESNA UNION N.J.	34
2	MF 1000-06	" " "	KAYLOC	35
1	PT02E-16-26 P.	RECEPTACLE PYGMY 26 PIN	AVNET CORP	36
1	PT06E-16-26S (SR)	PLUG PYGMY 26 PIN	LA 16, CALIF	37
1	MS 25224-1	SWITCH GUARD	CUTLER HAMMER	38
1	8280-K16	SWITCH SPDT	CUTLER HAMMER	39
1	108-901	JACK BANANA	E. F. JOHNSON	40
1	-902	↑	↑	41
1	-903			42
1	-904			43
1	-905			44
1	-906			45
1	-907			46
1	-908	↓	↓	47
1	108-909	JACK BANANA	E. F. JOHNSON NEWARK	48

PARTS LIST

PL 100-1-33-012 B

-12-42 SD
25X1

SHEET 1 OF 11 SHEETS REV.

TITLE
XMITTER, PHASE III
(ELECTRICAL PARTS LIST)

25X1

Prepared

Approved

Approved

12/10/62

5-17-63

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
6	SCM156BP015D4	CAPACITOR, TANT. - 15 μ F, 15V, TEXAS INST. DALLAS, TEX.	C1-1, C7-4, C8-4, C9-4, C10-4, C11-4	1
25	SCM476GP020D4	CAPACITOR, TANT. - 47 μ F, 20V, TEXAS INST. DALLAS, TEX.	C1-2, C1-4, C1-6, C1-8, C1-7, C1-9, C1-11,	2
			C2-5, C2-6, C2-7, C2-9, C2-10, C2-12,	—
			C2-13, C2-15, C2-16, C2-17, C2-14, C2-20	—
			C6-6, C7-11, C8-11, C9-11, C10-11, C11-11,	—
3	SCM226GP020D4	CAPACITOR, TANT. - 22 μ F, 20V, TEXAS INST. DALLAS, TEX.	C1-3, C1-12, C4-2	3
4	SCM226BP015D4	CAPACITOR, TANT. - 22 μ F, 15V, TEXAS INST. DALLAS, TEX.	C1-13, C4-5, C4-8, C4-9	4
2	SCM107HP020D4	CAPACITOR, TANT. - 100 μ F, 20V, TEXAS INST. DALLAS, TEX.	C1-10, C2-8	5
1	SCM227HP010D4	CAPACITOR, TANT. - 220 μ F, 10V, TEXAS INST. DALLAS, TEX.	C1-5	6
2	CPO8A1KB334K	CAPACITOR, -0.33 μ F, 100V- SPRAGUE N. ADAMS, MASS.	C4-1, C4-3,	7
3	SCM476BP006A4	CAPACITOR, TANT. - 47 μ F, 6V- TEXAS INST. DALLAS, TEX.	C2-1, C2-2, C6-1	8
15	SCM225FP020D4	CAPACITOR, TANT. - 2.2 μ F, 20V- TEXAS INST. DALLAS, TEX.	C2-3, C2-4, C2-18, C6-2, C6-3, C7-2,	9
			C7-10, C8-2, C8-10, C9-2, C9-10, C10-2,	—
			C10-10, C11-2, C11-10	—
6	SCM685BP020D4	CAPACITOR, TANT. - 6.8 μ F, 20V- TEXAS INST. DALLAS, TEX.	C2-11, C7-6, C8-6, C9-6, C10-6, C11-6	10
2	CL25BJ600UP3	CAPACITOR, TANT. - 60 μ F, 50V- SPRAGUE, N. ADAMS, MASS.	C2-10, C2-11	11

PARTS LIST

PL 100-1-33-012 B
SHEET 2 OF 11 SHEETS REV.

25X1

Prepared

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TITLE

XMITTER, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
16	SCM106BP020D4	CAPACITOR, TANT. - 10 μ F, 20V - TEXAS INST. DALLAS, TEX.	C4-4, C4-10, C5-2, C5-8, C5-9, C6-4, C7-1, C7-5, C8-1, C8-3, C9-1, C9-3, C10-1, C10-5, C11-1, C11-5,	12
2	SCM336GP020D4	CAPACITOR, TANT. - 33 μ F, 20V - TEXAS INST. DALLAS, TEX.	C4-6, C4-7	13
6	TG-P10	CAPACITOR, CERAMIC DISC - 0.1 μ F, 50V - SPRAGUE N. ADAMS, MASS.	C5-1, C7-9, C8-9, C9-9, C10-9, C11-9	14
7	SCM105BP020D4	CAPACITOR, TANT. - 10 μ F, 20V, TEXAS INST. DALLAS, TEX.	C5-5, C5-7, C7-7, C8-7, C9-7, C10-7, C11-7	15
1	SCM337HP006D4	CAPACITOR, TANT. - 330 μ F, 6V, TEXAS INST. DALLAS, TEX.	C6-5,	16
2	MCA05S47	CAPACITOR - (MYLAR-EPoxy) 0.047 μ F, 50V HOPKINS ENG. SAN FERNANDO, CAL.	C6-7, C6-8	17
5	SCM103FP035D2	CAPACITOR, TANT. - 0.01 μ F, 35V, TEXAS INST. DALLAS, TEX.	C7-3, C8-3, C9-3, C10-3, C11-3	18
5	DM-42-F-513-J	CAPACITOR - (ELMENDO) 0.051 μ F ARCO GREAT NECK, N.Y.	C7-8, C8-8, C9-8, C10-8, C11-8	19
1	DM-15-221K	CAPACITOR - (ELMENDO) 220 PF ARCO GREAT NECK, N.Y.	C5-3	20
2	DM-15-471K	CAPACITOR - (ELMENDO) 470 PF ARCO GREAT NECK, N.Y.	C5-4, C5-6	21
2	SCM333FP035D4	CAPACITOR - TANT. - 0.033 μ F, 35V TEXAS INST. DALLAS, TEX.	C5-10, C5-11	22
				23
				24

100-1-33-012 B

SHEET 3 OF 11 SHEETS	REV.
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Approved

TITL

TRANSMITTER, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
4	1N751A	DIODE, ZENER-5V TEXAS INST. DALLAS, TEX.	CR1-1, CR1-5, CR2-3, CR6-4,	25
18	1N270	DIODE, -	CR1-2, CR1-3, CR6-2, CR7-1, CR7-2, CR7-3, CR8-1, CR8-2, CR8-3, CR9-1, CR9-2, CR9-3, CR10-1, CR10-2, CR10-3, CR11-1, CR11-2, CR11-3	26
12	1N643	DIODE, -	CR1-4, CR2-1, CR2-2, CR4-1, CR4-2, CR4-3, CR5-1, CR5-2, CR5-3, CR5-4, CR5-5, CR6-3,	27
1	1N965B	DIODE, ZENER-15V- MOTOROLA, INC. PHOENIX, ARIZ.	CR6-1,	28
5	1N763	DIODE, ZENER-7V- GENERAL INST. CORP., NEWARK, N.J.	CR7-4, CR8-4, CR9-4, CR10-4, CR11-4,	29
21	1N459	DIODE, -	CR7-5, CR7-6, CR7-7, CR8-5, CR8-6, CR8-7, CR9-5, CR9-6, CR9-7, CR10-5, CR10-6, CR10-7, CR11-5, CR11-6, CR11-7, CR12-8, CR8-8, CR9-8, CR10-8, CR11-8, CR1001	30
				31
				32
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PARTS LIST

PL 100-1-33-012 B
SHEET 6 OF 11 SHEETS REV.

25X1

Prepared

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TITLE

XMITTER, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
22	2N2222	TRANSISTOR, MOTOROLA, INC. PHOENIX, ARIZ.	Q1-1, Q1-3, Q1-5, Q2-1, Q2-4, Q2-5, Q4-1, Q4-2, Q4-3, Q5-7, Q6-2, Q6-4, Q7-3, Q7-5, Q8-3, Q8-5, Q9-3, Q9-5, Q10-3, Q10-5, Q11-3, Q11-5	48
2	2N328A	TRANSISTOR, RAYTHEON NEEDHAM, MASS.	Q1-2, Q2-3	49
49	2N861	TRANSISTOR, PHILCO PHILADELPHIA, PA.	Q1-4, Q1-6, Q1-7, Q1-8, Q1-9, Q2-2, Q4-4, Q5-1, Q5-2, Q5-3, Q5-4, Q5-5, Q5-6, Q5-8, Q5-9, Q5-10, Q6-1, Q6-3, Q6-5, Q7-1, Q7-2, Q7-4, Q7-6, Q7-7, Q7-8, Q8-1, Q8-2, Q8-4, Q8-6, Q8-7, Q8-8, Q9-1, Q9-2, Q9-4, Q9-6, Q9-7, Q9-8, Q10-1, Q10-2, Q10-4, Q10-6, Q10-7, Q10-8, Q11-1, Q11-2, Q11-4, Q11-6, Q11-7, Q11-8	50
				51
				52

PARTS LIST

PL 100-1-33-012

B

SHEET 7 OF 11 SHEETS REV.

25X1

25X1

Prepared				TITLE
Approved				XMITTER, PHASE III
Approved				(ELECTRICAL PARTS LIST)
QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
13	RC07GF472K	RESISTOR MIL-R-11, 4.7K Ω 1/4W	R1-1, R1-15, R1-23, R2-3, R2-5, R2-11, R1001 R6-6, R7-18, R8-18, R9-18, R10-18, R11-18.	53
15	RC07GF682K	RESISTOR MIL-R-11, 6.8K Ω 1/4W	R1-2, R1-6, R1-17, R1-22, R4-5, R7-1, R7-21, R8-1, R8-21, R9-1, R9-21, R10-1, R10-21, R11-1, R11-21.	54
8	RC07GF182K	RESISTOR MIL-R-11, 1.8K Ω 1/4W	R1-3, R2-8, R2-10, R7-15, R8-15, R9-15, R10-15, R11-15.	55
8	RC07GF471K	RESISTOR MIL-R-11, 470 Ω 1/4W	R1-4, R1-16, R1-26, R2-12, R2-15, R4-1, R4-11, R6-23.	56
12	RC07GF561K	RESISTOR MIL-R-11, 560 Ω 1/4W	R1-5, R1-18, R2-9, R2-24, R2-27, R2-28, R4-2, R7-13, R8-13, R9-13, R10-13, R11-13.	57
1	RC07GF104K	RESISTOR MIL-R-11, 100K Ω 1/4W	R1-7	58
12	RC07GF101K	RESISTOR MIL-R-11, 100 Ω 1/4W	R1-9, R1-20, R2-20, R5-4, R5-30 R5-32, R6-13, R7-20 R8-20, R9-20, R10-20 R11-20	59
				60

Prepared				TITLE	
Approved				XMITTER, PHASE III	
Approved				(ELECTRICAL PARTS LIST)	
QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	
6	RC07GF272K	RESISTOR MIL-R-11, 2.7K Ω 1/4 W	R1-13, R1-25, R5-28 R5-34, R6-1, R6-24	61	
20	RC07GF222K	RESISTOR MIL-R-11, 2.2K Ω 1/4 W	R1-8, R1-19, R1-21, R1-27, R2-13, R4-7, R5-6, R5-8, R5-16, R5-19, R5-20, R5-25, R5-29, R7-8, R8-8, R9-8, R10-8, R11-8,	62	
		R2-18, R6-26		—	
3	RC07GF681K	RESISTOR MIL-R-11, 680 Ω 1/4 W	R1-10, R4-17 R2-16	63	
33	RC07GF103K	RESISTOR MIL-R-11, 10K Ω 1/4 W	R1-11, R4-13, R4-14, R4-16, R5-14, R5-24, R6-18, R6-21, R7-9, R7-12, R7-14, R7-22, R7-23, R8-9, R8-12, R8-14, R8-22, R8-23, R9-9, R9-12, R9-14, R9-22, R9-23, R10-9, R10-12, R10-14, R10-22, R10-23, R11-9, R11-12, R11-14, R11-22, R11-23.	64	
6	RC07GF273K	RESISTOR MIL-R-11, 27K Ω 1/4 W	R1-12, R5-3, R5-11, R5-13, R5-22, R5-23	65	
17	RC07GF102K	RESISTOR MIL-R-11, 1.0K Ω 1/4 W	R1-14, R2-14, R2-18, R4-19, R6-4, R6-22, R7-3, R7-19, R8-3, R8-19, R9-3, R9-19, R10-3, R10-19, R11-3, R11-19, R2-25	66	
2	RC07GF271K	RESISTOR MIL-R-11, 270 Ω 1/4	R1-24, R9-6	67	

PARTS LIST

PL 100-1-55-012

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25X1

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SHEET 9 OF 11 SHEETS REV.

TITLE

XMITTER, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
3	RC07GF332K	RESISTOR MIL-R-11, 3.3K Ω $\frac{1}{4}$ W	R1-28, R4-4, R6-8	68
7	RC07GF393K	RESISTOR MIL-R-11, 39K Ω $\frac{1}{4}$ W	R2-6, R2-7, R7-2, R11-2 R8-2, R9-2, R10-2	69
				70
1	RC07GF152K	RESISTOR MIL-R-11, 1.5K Ω $\frac{1}{4}$ W	R2-26	71
				72
1	RC07GF153K	RESISTOR MIL-R-11, 15K Ω $\frac{1}{4}$ W	R4-3	73
2	RC07GF820K	RESISTOR MIL-R-11, 82 Ω $\frac{1}{4}$ W	R4-9, R4-10	74
2	RC07GF123K	RESISTOR MIL-R-11, 12K Ω $\frac{1}{4}$ W	R4-15, R6-14	75
9	RC07GF183K	RESISTOR MIL-R-11, 18K Ω $\frac{1}{4}$ W	R5-1, R5-15, R5-17 R5-27, R7-6, R8-6	76
			R9-6, R10-6, R11-6	-
2	RC07GF473K	RESISTOR MIL-R-11, 47K Ω $\frac{1}{4}$ W	R5-2, R5-18, R2-1	77
3	RC07GF151K	RESISTOR MIL-R-11, 150 Ω $\frac{1}{4}$ W	R5-7, R5-9, R5-21	78
8	RC07GF223K	RESISTOR MIL-R-11, 22K Ω $\frac{1}{4}$ W	R5-10, R5-12, R5-26 R7-17, R8-17, R9-17	79
			R10-17, R11-17	-
6	RC07GF333K	RESISTOR MIL-R-11, 33K Ω $\frac{1}{4}$ W	R5-35, R7-5, R8-5 R9-5, R10-5, R11-5	80
				-

PARTS LIST

PL 100-1-33-012 B

-12-62 SD
25X1

SHEET 10 OF 11 SHEETS REV.

Prepared

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TITLE

XMITTER, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
15	RC07GF562K	RESISTOR MIL-R-11, 5.6K Ω 1/4W	R5-5, R5-6, R5-33, R6-15, R6-20, R7-4, R7-17, R8-4, R8-17, R9-4, R9-17, R10-4, R10-17, R11-4, R11-17	91 — —
3	RC07GF392K	RESISTOR MIL-R-11, 3.9K Ω 1/4W	R6-2, R6-12, R6-19	82
2	RC07GF201K	RESISTOR MIL-R-11, 200 Ω 1/4W	R6-5, R6-11	83
1	RC07GF122K	RESISTOR MIL-R-11, 1.2K Ω 1/4W	R6-3	84
1	RC07GF822K	RESISTOR MIL-R-11, 8.2K Ω 1/4W	R6-9	85
1	RC07GF391K	RESISTOR MIL-R-11, 390 Ω 1/4W	R6-10	86
6	RC07GF331K	RESISTOR MIL-R-11, 330 Ω 1/4W	R6-16, R7-10, R8-10, R9-10, R10-10, R11-10	87
5	RC07GF821K	RESISTOR MIL-R-11, 820 Ω 1/4W	R7-11, R8-11, R9-11, R10-11, R11-11	88
1	RC20GF821K	RESISTOR MIL-R-11, 820 Ω 1/2W	R4-8	89
3	RC42GF121K	RESISTOR MIL-R-11, 120 Ω 2W	R2-19, R2-21, R2-22	90
9	236L-1-102	POT-1K Ω 0.8W - BOURNS RIVERSIDE, CALIF.	R2-2, R2-4, R4-18, R6-7, R7-16, R8-16, R9-16, R10-16, R11-16	91 —
3	236L-1-502	POT-5K Ω 0.8W - BOURNS RIVERSIDE, CALIF.	R4-12, R6-17, R6-25	92
1	E299DD/P116	VARISTOR - FERROXUBE CORP. OF AMERICA, SAUGERTIES, N.Y.	R1-8	93

PARTS LIST

PL 100-1-34-000 B
SHEET 2 OF 3 SHEETS REV.

25X1

3-13-63

25X1

Prepared

Approved

Approved

7-17-62

5-17-63

TITLE

PARTS LIST
CONTROL UNIT

25X1

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV
2	100-1-34-003	SUPPORT		1	
2	-004	*POST-MOUNTING		2	
10	-005	POST - TERM. BOARD		3	
1	-006	PLATE-RECEPTACLE MOUNTING		4	
1	-007	BASE PLATE		5	
1	-008	PAN MOUNTING		6	
5	-009	TERMINAL BOARD CHANNEL		7	
1	-010	TERMINAL BOARD TOP		8	
1	-011	COVER, CONTROL UNIT		9	
1	-012	TERMINAL BOARD STRIP		10	
1	-013	COVER-TEST POINT		11	
1	100-1-34-014	HINGE		12	
REF	100-1-34-002	CONTROL, PHASE III (ELEC. PARTS LIST)		13	B
REF	100-1-34-001	SCHEMATIC DIAGRAM		14	
REF	5-0001	FINISH SPEC		15	25X1
REF	100-1-34-015	CONTROL UNIT & LOGIC BLOCK DIAGRAM		16	B

PARTS LIST

PL 100-1-34-000 B

SHEET 3 OF 3 SHEETS REV.

TITLE

CONTROL UNIT
PARTS LIST

Prepared

-18-62

Approved

Approved

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
6	X1246-B-3/16	STANDOFF-CTC CAMBRIDGE, MASS		17
1	NYQ-6	NUT-NYLON-ESNA UNION, N.Y.		18
				19
1	PT02E-12-10S	RECEPTACLE-10 PIN	J203	20
1	PT02E-16-26PW	" 26 PIN	J201	21
1	PT02E-16-26SW	" 26 PIN	J204	22
1	PT02E-16-26S	RECEPTACLE-26 PIN	J202	23
		BENDIX SCINTILLA -SIDNEY, N.Y.		24
REF	PT06E-12-10P(SR)	PLUG-10 PIN		25
REF	PT06E-16-26SW(SR)	" 26 PIN		26
REF	PT06E-16-26PW(SR)	" 26 PIN		27
REF	PT06E-16-26P(SR)	PLUG-26 PIN		28
				29
REF	100-1-34-016	TERMINAL BOARD NO. 7 ASSY.		30
				31
				32

PARTS LIST

SHEET 1 OF 12 SHEETS REV.

TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

Prepared

Approved

Approved

7-12-62

7-12-62

5-17-63

N.A.

100-1-34-000

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
2	SCM223FP035D2	CAPACITOR, TANT. - .022 μ F, 35V- TEXAS INST. DALLAS, TEX.	C29, C32	1	
2	SCM683FP035D2	CAPACITOR, TANT. - .068 μ F, 35V- TEXAS INST. DALLAS, TEX.	C24, C33	2	
6	SCM105FP035D4	CAPACITOR, TANT. - 1.0 μ F, 35V- TEXAS INST. DALLAS, TEX.	C5-1, C5-2, C5-3, C5-4, C5-5, C50	3	
1	SCM475BF035D4	CAPACITOR, TANT. - 4.7 μ F, 35V- TEXAS INST. DALLAS, TEX.	C17	4	
4	SCM685BP035D4	CAPACITOR, TANT. - 6.8 μ F, 35V- TEXAS INST. DALLAS, TEX.	C27, C30, C38, C39	5	
1	SCM106GP020D4	CAPACITOR, TANT. - 10 μ F, 20V- TEXAS INST. DALLAS, TEX.	C26	6	
5	SCM226GP015D4	CAPACITOR, TANT. - 22 μ F, 15V- TEXAS INST. DALLAS, TEX.	C4-1, C4-2, C4-3, C4-4, C4-5	7	
4	SCM336HP020D4	CAPACITOR, TANT. - 33 μ F, 20V- TEXAS INST. DALLAS, TEX.	C1-2, C1-3, C1-4, C1-5	8	A
17	SCM686GP015D4	CAPACITOR, TANT. - 68 μ F, 15V- TEXAS INST. DALLAS, TEX.	C3-1, C6-1, C7-1, C3-2, C6-2, C7-2, C3-3, C6-3, C7-3, C3-4, C6-4, C7-4, C3-5, C6-5, C7-5, C37, C40	9	
11	SCM107HP020D4	CAPACITOR, TANT. - 100 μ F, 20V- TEXAS INST. DALLAS, TEX.	C2-1, C12-1, C2-2, C12-2, C2-3, C12-3, C2-4, C12-4, C2-5, C12-5, C31	10	
20	DM-15-221K	CAPACITOR - 'ELMENDO' ARCO 220PF GREAT NECK, N.Y.	C10-1, C14-1, C15-1, C10-2, C14-2, C15-2, C10-3, C14-3, C15-3, C10-4, C14-4, C15-4, C10-5, C14-5, C15-5, C18, C20, C21, C22, C23	11	

FL 100-1-37-002 C

2-12-62 25X1

SHEET 2 OF 12 SHEETS REV.

Prepared

Approved

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7-12-62

7-12-62

TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

25X1

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM
11	DM-15-102J	CAPACITOR, (ELMENCO) ARCO 1000PF GREAT NECK, N.Y.	C11-1, C13-1, C11-2, C13-2, C11-3, C13-3, C11-4, C13-4, C11-5, C13-5, C36,	12
1	DM-19-332K	CAPACITOR, (ELMENCO) ARCO 3300PF GREAT NECK, N.Y.	C25,	13
5	MC80V103AM	CAPACITOR CERAMIC AEROVOX -014uf 100V OLEAN, N.Y.	C8-1, C8-2, C8-3, C8-4, C8-5	14
5	TYPE 627G	CAPACITOR-.015uf, 50V, GOODALL ELECT. OGALLALA, NEBR.	C9-1, C9-2, C9-3, C9-4, C9-5,	15
1	TYPE 627G	CAPACITOR-.047uf, 50V, GOODALL ELECT. OGALLALA, NEBR.	C28,	16
1	TYPE 627G	CAPACITOR-.22uf, 50V, GOODALL ELECT. OGALLALA, NEBR.	C42,	17
1	TYPE 627G	CAPACITOR-.33uf, 50V, GOODALL ELECT. OGALLALA, NEBR.	C43,	18
1	1P1684C	CAPACITOR-.68uf, 100V, HOPKINS ENG. SAN FERNANDO, CAL.	C34,	19
1	SCM685BP03SD2	CAPACITOR, TANT -6-84uf 35V TEXAS INS. DALLAS, TEX.	C19	20
2	WE 1-684	CAPACITOR .68uf 100VDC METALLIZED 10% TOLERANCE PAPER-ELECTRON PRODUCTS.	C35, C41	21
				22
				23

SHEET 3 OF 12 SHEETS REV.

TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

Prepared

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Approved

QUAN.

PART NUMBER

DESCRIPTION

CIRCUIT SYMBOL NO.

ITEM REV.

18

IN458

DIODE.

CR6-1, CR7-1, CR6-2,
CR7-2, CR6-3, CR7-3,

24

CR6-4, CR7-4, CR6-5,
CR7-5, CR12, CR15,CR17, CR18,
CR19, CR24, CR29,

CR45

71

IN625

DIODE.

CR1-1, CR2-1, CR3-1,
CR4-1, CR8-1, CR9-1,

25

CR10-1, CR11-1, CR1-2,
CR2-2, CR3-2, CR4-2,CR8-2, CR9-2, CR10-3,
CR11-2, CR1-3, CR2-3,CR3-3, CR4-3, CR6-3,
CR9-3, CR10-3, CR11-3,CR1-4, CR2-4, CR3-4,
CR4-4, CR8-4, CR9-4,CR10-4, CR11-4, CR1-5,
CR2-5, CR3-5, CR4-5,CR8-5, CR9-5, CR10-5,
CR11-5, CR13, CR14,CR20, CR21, CR22,
CR25, CR26, CR28,CR30, CR31, CR32,
CR33, CR34, CR35,CR36, CR37, CR39,
CR40, CR41, CR42,CR95, CR96
CR97, CR98CR43, CR44, CR46,
CR47, CR48, CR49

CR99

1

IN749A

DIODE, ZENER. - 4.8V

CR27,

26

25X1

25X1

PL 100-1-34-002

SHEET 4 OF 12 SHEETS	REV.
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TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

Prepared

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Approved

QUAN.

PART NUMBER

DESCRIPTION

CIRCUIT SYMBOL NO.

ITEM

REV

7

IN 751A

DIODE, ZENER, -5.1V

CR5-1, CR5-2, CR5-3, CR5-4, CR5-5, CR23, CR38

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PARTS LIST

PL 100-1-34-002 1 U

12-62 SD.
25X1

SHEET 5 OF 12 SHEETS REV.

Prepared

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TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
2	38H-931	LAMP CARTRIDGE (NEON) DIALCO, (TRANS. ENCL.) BROOKLYN, N.Y.	DS1, DS2	33	
2	38H-937	LAMP CARTRIDGE (NEON) DIALCO, (TRANS. ENCL.) BROOKLYN, N.Y.	DS3, DS4	34	
4	7E38	LAMP HOLDER, DIALCO, BROOKLYN, N.Y.	DS1, DS2, DS3, DS4	35	
				36	
				37	
1	CF12-6A	INCANDESCENT LIGHT BASE		38	
		T2 TYPE LAMP ELDEMA CORP. EL MONTE, CALIF.		39	
1	2K	LAMP HOLDER ELDEMA CORP. EL MONTE, CALIF.		40	
1	CL-604L	PHOTOCELL, CLAIREX CORP.		41	
				42	
				43	

PARTS LIST

PL 100-1-54-002

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SHEET 6 OF 12 SHEETS REV.

25X1

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TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.

PART NUMBER

DESCRIPTION

CIRCUIT SYMBOL NO.

ITEM REV.

1

VGG2026.5VD-S12A1

RELAY, 31 DT,

ELGIN ADVANCE RELAYS
BURBANK CALIFORNIA

K2,

44

2

RP-989669

RELAY 31 DT,

C.P. CLARE CO
HOLLYWOOD, CALIF

K3, K4,

45

46

47

PARTS LIST

FL 100-1-34-002

SHEET 7 OF 12 SHEETS REV.

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TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
5	2N736A	TRANSISTOR, - TEXAS INST. DALLAS, TEX.	Q3-1, Q3-2, Q3-3, Q3-4, Q3-5,	48	
43	2N861	TRANSISTOR PHILCO PHILADELPHIA, PA.	Q4-1, Q8-1, Q9-1, Q4-2, Q8-2, Q9-2,	49	
			Q4-3, Q8-3, Q9-3, Q4-4, Q8-4, Q9-4,	—	
			Q4-5, Q8-5, Q9-5, Q12, Q14, Q15,	—	
			Q18, Q19, Q21, Q22, Q24, Q25,	—	
			Q26, Q28, Q29, Q30, Q31, Q33,	—	
			Q34, Q35, Q38, Q39, Q40, Q41,	—	
			Q42, Q43, Q48, Q49, Q50, Q51,	—	
			Q52,	—	
5	2N929	TRANSISTOR, - TEXAS INST. DALLAS, TEX.	Q2-1, Q2-2, Q2-3, Q2-4, Q2-5,	50	
5	2N1479	TRANSISTOR, - RCA HARRISON N.J.	Q16, Q20, Q23, Q45, Q47,	51	
29	2N2222	TRANSISTOR, - MOTOROLA, INC. PHOENIX, ARIZ.	Q1-1, Q5-1, Q6-1, Q7-1, Q1-2, Q5-2,	52	
			Q6-2, Q7-2, Q1-3, Q5-3, Q6-3, Q7-3,	—	
			Q1-4, Q5-4, Q6-4, Q7-4, Q1-5, Q5-5,	—	
			Q6-5, Q7-5, Q10, Q13, Q17,	—	
			Q27, Q32, Q36, Q37, Q44, Q45,	—	

PARIS LIST

FL 100-1-54-UUL

2-12-62 SD

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SHEET 8 OF 12 SHEETS REV.

TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

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QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
10	RC07GF680J	RESISTOR MIL-R-11, 68Ω, 1/4 W	R9-1, R14-1, R9-2, R14-2, R9-3, R14-3, R9-4, R14-4, R9-5, R14-5	53	
22	RC07GF101J	RESISTOR MIL-R-11, 100Ω, 1/4 W	R17-1, R17-2, R17-3, R17-4, R17-5, R43	54	
		R6-1, R5-2, R5-3, R5-4 R5-4, R38-1, R38-2, R38-3, R38-4, R38-5	R90, R107, R114, R115, R118, R130	—	
11	RC07GF151J	RESISTOR MIL-R-11, 150Ω, 1/4 W	R24-1, R39-1, R24-2, R39-2, R24-3, R39-3, R24-4, R39-4, R24-5, R39-5, R46	55	
1	RC07GF181J	RESISTOR MIL-R-11, 180Ω, 1/4 W	R120	56	
11	RC07GF102J	RESISTOR MIL-R-11, 1.0KΩ, 1/4 W	R19-1, R19-2, R19-3, R19-4, R19-5, R51	57	
			R57, R65, R79, R124, R134	—	
4	RC07GF122J	RESISTOR MIL-R-11, 1.2KΩ, 1/4 W	R80, R88, R100, R103	58	
14	RC07GF152J	RESISTOR MIL-R-11, 1.5KΩ, 1/4 W	R2-1, R2-2, R2-3, R2-4, R2-5, R75, R80, R101, R131, R135	59	
			R29-1, R29-2, R29-3, R29-4, R29-5	—	
16	RC07GF222J	RESISTOR MIL-R-11, 2.2KΩ, 1/4 W	R13-4, R18-4, R13-5, R18-5, R52, R58	60	
			R66, R95, R125, R125, R13-1, R13-2, R13-2, R18-2, R13-3, R18-3	—	
1	RC07GF221J	RESISTOR, MIL-R-11, 220Ω, 1/4 W.	R143	61	C

PARTS LIST

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SHEET 9 OF 12 SHEETS REV.

TITLE

CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

Prepared					
Approved					
Approved					
QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
31	RC07GF272 J	RESISTOR MIL-R-11, 2.7K Ω , 1/4 W	R23-1, R27-1, R32-1, R37-1, R23-2, R27-2, R32-2, R37-2, R233 R27-3, R32-3, R37-3, R23-4, R27-4, R32-4, R37-4, R23-5, R27-5, R32-5, R37-5, R45, R49, R59, R64, R67, R72, R91, R110, R112, R126, R129	62	
7	RC07GF332 J	RESISTOR MIL-R-11, 3.3K Ω , 1/4 W	R8-1, R8-2, R8-3, R8-4, R8-5, R81, R98	63	
15	RC07GF392 J	RESISTOR MIL-R-11, 3.9K Ω , 1/4 W	R15-1, R16-1, R30-1, R15-2, R16-2, R30-2, R15-3, R16-3, R30-3, R15-4, R16-4, R30-4, R15-5, R16-5, R30-5,	64	
22	RC07GF472 J	RESISTOR MIL-R-11, 4.7K Ω , 1/4 W	R1-1, R10-1, R1-2, R10-2, R1-3, R10-3, R1-4, R10-4, R1-5, R10-5, R41, R53, R76, R80, R85, R97, R108, R109, R119, R121, R135, R113	65	

PARTS LIST

PL 100-1-34-002 C

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SHEET 10 OF 12 SHEETS REV.

TITLE

CONTROL, PHASE III.
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	REV.
7	RC07GF562J	RESISTOR MIL-R-11, 5.6K Ω , 1/4 W	R55, R14, R83, R93, R96, R99	66	
1	RC07GF682J	RESISTOR MIL-R-11, 6.8K Ω , 1/4 W	R78	67	
				68	
13	RC07GF103J	RESISTOR MIL-R-11, 10K Ω , 1/4 W	R12-1, R12-2, R12-3, R12-4, R12-5, R50, R149, R56, R82, R87, R102, R111, R117	69	C
16	RC07GF123J	RESISTOR MIL-R-11, 12K Ω , 1/4 W	R33-1, R36-1, R33-2, R36-2, R33-3, R36-3, R33-4, R36-4, R33-5, R36-5, R60, R63, R65, R71, R116, R118	70	
5	RC07GF153J	RESISTOR MIL-R-11, 15K Ω , 1/4 W	R77, R92, R94, R103, R127	71	
15	RC07GF183J	RESISTOR MIL-R-11, 18K Ω , 1/4 W	R7-1, R26-1, R26-2, R7-3, R7-4, R26-4, R26-5, R42, R55, R73, R83, R133	72	
7	RC07GF223J	RESISTOR MIL-R-11, 22K Ω , 1/4 W	R25-1, R25-2, R25-3, R25-4, R25-5, R47, R20-1	73	C
13	RC07GF273J	RESISTOR MIL-R-11, 27K Ω , 1/4 W	R23-1, R31-1, R28-1, R31-2, R2-2, R31-3, R21-1, R21-2, R31-3, R21-4, R21-5, R21-6, R21-7, R21-8, R21-9, R21-10, R21-11, R21-12, R21-13, R21-14, R21-15, R21-16, R21-17, R21-18, R21-19, R21-20, R21-21, R21-22, R21-23, R21-24, R21-25, R21-26, R21-27, R21-28, R21-29, R21-30, R21-31, R21-32, R21-33, R21-34, R21-35, R21-36, R21-37, R21-38, R21-39, R21-40, R21-41, R21-42, R21-43, R21-44, R21-45, R21-46, R21-47, R21-48, R21-49, R21-50, R21-51, R21-52, R21-53, R21-54, R21-55, R21-56, R21-57, R21-58, R21-59, R21-60, R21-61, R21-62, R21-63, R21-64, R21-65, R21-66, R21-67, R21-68, R21-69, R21-70, R21-71, R21-72, R21-73, R21-74, R21-75, R21-76, R21-77, R21-78, R21-79, R21-80, R21-81, R21-82, R21-83, R21-84, R21-85, R21-86, R21-87, R21-88, R21-89, R21-90, R21-91, R21-92, R21-93, R21-94, R21-95, R21-96, R21-97, R21-98, R21-99, R21-100	74	C
4	RC076F333J	RESISTOR MIL-R-11, 33K Ω , 1/4 W	R20-3, R20-4, R20-5	75	C

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SHEET 11 OF 12 SHEETS REV.

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CONTROL, PHASE III
(ELECTRICAL PARTS LIST)

QUAN.	PART NUMBER	DESCRIPTION	CIRCUIT SYMBOL NO.	ITEM	Ref
14	RC07GF393J	RESISTOR MIL-R-11, 39K Ω , 1/4 W	R34-1, R35-1, R34-2, R35-2, R34-3, R35-3, R34-4, R35-4, R34-5, R35-5, R61, R62, R69, R70	76	
19	RC07GF473J	RESISTOR MIL-R-11, 47K Ω , 1/4 W	R6-1, R11-1, R29-1, R6-2, R11-2, R21-2, R29-2, R6-3, R11-3, R21-3, R29-3, R6-4, R11-4, R21-4, R29-4, R6-5, R11-5, R21-5, R29-5	77	c
1	RC07GF913J	RESISTOR MIL-R-11, 91K Ω , 1/4 W	R132	78	
5	RC20GF331J	RESISTOR MIL-R-11, 330 Ω , 1/2 W	R3-1, R3-2, R3-3, R3-4, R3-5	79	
1	RC20GF821J	RESISTOR MIL-R-11, 820 Ω , 1/2 W	R42	80	
5	RC20GF152J	RESISTOR MIL-R-11, 1.5K Ω , 1/2 W	R4-1, R4-2, R4-3, R4-4, R4-5	81	
4	RC20GF223J	RESISTOR MIL-R-11 22K 1/2 W	R139, R190 R191, R192	82	

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SHEET 12 OF 12 SHEETS	REV
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CONTROL, PHASE II
(ELECTRICAL PARTS LIST)

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